The Builder.

VOL. LXVII. NO. 2701. NOVEMBER 10, 1894.

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The Distribution of Power.

AT the present time, when so much depends upon conducting the various industries of a country in the most economical manner, there could be no subject of greater interest and importance to either the scientific or business man than that dealing with the generation and distribution of power.

It will appear evident to most of us that at least theoretically it should be more economical to generate power on a large scale at a central station, and to distribute it to consumers that they may be able to use it in such quantities and at such times as best suits their requirements, than for these consumers themselves to produce it at the several places where it is used.

A popular example of the production and distribution of a particular form of power is provided by the various gas companies. In all large towns this source of power is always available, and can be used in large or small quantities. There are, however, many other kinds of power available, and as there are several methods of distributing such energy, a knowledge of many departments of engineering is necessary to enable any one to thoroughly investigate this subject. Scientifically we speak of energy being generated, and it is desirable to regard this energy as a commodity which can be manufactured in a convenient form, capable of being transmitted to considerable distances, and distributed and sold to consumers.

It is essential in an investigation of this nature to remember that energy cannot be created, and that the utmost we are able to do is to change one form of energy into another form which is more suitable for the special kind of work we require it to perform. It is, of course, impossible to extract from any machine more energy than we put into it, but we are able to bring a particular form of energy to it, and exchange that for an equivalent of another kind that may suit our purpose better. Take, for example, the production of electricity, of which we hear so much at the present day. Large buildings are erected, stocked with machinery and steam-boilers for the production of this particular kind of energy, but all the discoveries that have been made in electrical science only enable us to obtain another *form* of power, for the generation of which we have to exchange an equivalent quantity of another sort—namely, that which is contained in the coal required to raise steam.

One of the most convenient forms of mechanical energy is that known as hydraulic power. Water power is by no means a new force, but water power as formerly understood was limited in its application to systems of mechanism suitable for the low-pressures found in Nature. The results that have been obtained by the use of high-pressures are so different from all previous experience that a new name was needed, and we now term this particular form of energy Hydraulic Power.

Theoretically nothing could be more simple than this system. For working such machinery as cranes, lock-gates, lifts, &c., which are only required to be in action for short periods, and intermittently, it is unequalled. At the present time there are two systems in general use, the low-pressure system with reservoir storage, in which the pressure generally ranges between 150 lbs. and 250 lbs. per square inch, and the high-pressure system with accumulator storage, the usual pressure in this case being between 700 lbs. and 800 lbs. per square inch. In the latter case there are often several stations for generating the power, from which it is conveyed by mains to the various consumers, who may be scattered over a very considerable area.

The loss of power due to friction in the mains is insignificant with high-pressures, and is not of very great importance even with low-pressures. The first attempt to distribute high-pressure water to several consumers was made at Hull. The principal main here is 6 in. in diameter, and about three-quarters of a mile long. The quantity of water used is measured in each case by meter, and its cost is determined by a scale of charges based on the yearly amount taken by the consumer.

In 1871 an Act was obtained for supplying hydraulic power in London, but the present company was not constituted until about ten years ago. In 1887, however, there were some twenty-five miles of pressure-pipes laid in the London streets, and these have been so extended of late years, that at the present time there are no less than sixty miles of these mains. For generating the pressure there are three principal pumping-stations, one near the Blackfriars Bridge, another at Westminster, and the third at Wapping. Another in the City-road is now being constructed. The aggregate power of all the stations, when complete, will be but very little under 4,000 indicated h.-p. The water needed is mostly taken from the river, and is filtered before being used. After use it is not returned to the pumping-station, but allowed to run into the sewers.

This company makes a minimum charge of twenty-five shillings per quarter per machine, but for consumers using larger quantities of water there are graduated charges, decreasing as the amount used increases.

Professor Unwin, in his important work* on the transmission of power, which has furnished the subject of this article, points out that the cost of power for the kind of work for which a hydraulic system is best suited will be found to be small, being often less than one farthing per ton raised 50 ft. As already stated, however, it is only where power used intermittently is required that this system will be found economical; if employed for machinery working continuously, its cost is greater than for power obtained in other ways.

Another means of transmitting power from a central station to several consumers is that known as the compressed air system. For hydraulic power, the water needed has often to be purchased, and sometimes filtered, and means must be provided for allowing it to flow away after it has done its work. With air, however, the case in these respects is much more favourable, since it is always available, and can be discharged anywhere after use without creating any nuisance. The necessary motors worked expansively are efficient, the loss in the mains is very small, and the differences in level between the compressing and working points are unimportant.

In both the great installations in Paris and Birmingham it has unfortunately happened that there are conditions of development very unfavourable to the complete and fair trial of compressed air as a means of transmission; and Professor Unwin states that it is reasonably certain that with greater attention to scientific principles better results are obtainable than have hitherto been reached in the use of compressed air. In Paris there are motors ranging in power

* "The Development and Transmission of Power from Central Stations, being the Howard Lectures delivered at the Society of Arts in 1893." By William Cawthorne Unwin, F.R.S. London: Longmans, Green, & Co. 1894

between $\frac{1}{10}$ h.-p. and 150 h.-p., the majority being under 1 h.-p., and this fact alone shows how easy it is to subdivide the power in a compressed air system. The motors can be started and stopped by merely opening and closing the supply-valve, and there is no practical difficulty in measuring the quantity of air used.

In the Paris system the length of the principal mains is some thirty-four miles, and the loss of pressure due to friction in these mains rarely reaches 8 lbs. per square inch. The new main from the Quai de la Gare to the Place de la Concorde is 20 in. in diameter, the air pressure being 90 lbs. per square inch.

Professor Unwin also deals in his work with pneumatic transmission in a very exhaustive manner, describing the many different kinds of motors and compressors now in general use, and examining the various installations both in this country and on the Continent.

The utilisation of the enormous energy which is continuously expended at the Niagara Falls has always been a favourite subject of contemplation with engineers. The lakes that extend half-way across the continent of North America form storage reservoirs for the rainfall on an area of one quarter of a million square miles, the water flowing ultimately through the Niagara River, falling 326 ft. in a distance of 36 miles. The average discharge through this short river has been estimated at 300,000 cubic ft. per second, a volume sufficient to yield some 7,000,000 h.-p., if it could all be utilised.

From very early times water-mills were built in the rapids above the Falls, but in 1853 a more important scheme was started, and by 1861 a "hydraulic canal" had been constructed 35 ft. wide and 8 ft. deep, which receives water at a point nearly a mile above the Falls. This canal conveys water to a line of mills, and furnishes about 6,000 h.-p. Owing to the success that attended this scheme the canal has recently been enlarged, and is now capable of providing much greater power.

In 1886 the Niagara Falls Power Company was formed, and a charter was obtained from the State of New York, giving full right to construct the works necessary to utilise 200,000 h.-p. As Professor Unwin states, this project involves special difficulties. The works are of unprecedented magnitude, not only in the aggregate, but in detail and in the size of individual units. The commercial condition is also an absolutely governing one. Steam power is cheap in the district, and unless the water power can be distributed at a price less than that of steam power, the market for it would be very restricted. The fall is so advantageous that the cost of power at the turbine shaft will be extremely low, but if heavy charges are needed to cover expenditure on distributing machinery its development will be useless.

The works now being carried out on the United States side, and partly completed, consists of the construction of a head-race canal 200 ft. wide, 1,500 ft. long, and 17 ft. deep, as well as a great tunnel tail-race about $1\frac{1}{4}$ miles long, 21 ft. high, and nearly 19 ft. wide. The net section of this tunnel is 386 square feet, and it will discharge the tail water of turbines developing 100,000 h.-p. The Canadian Government have recently granted a charter to a company for similar works on the other side, and the conditions for developing power here are more favourable than on the American side of the river.

Besides the various methods of producing and distributing power to which we have already alluded, Professor Unwin discusses many others, such as Electrical Transmission, Telo-dynamic Transmission, the distribution of Gas and also of Steam for power purposes. The space at our command, however, does not permit us to comment upon these subjects further than to state that they are as fully described and illustrated in the book as those which we have briefly considered.

Probably no one is more capable to write such a work as the one now before us than Professor Unwin, who has long been recognised as one of the greatest authorities on these subjects, and we feel that in this case the book requires no further recommendation than to state the name of its author.

NOTES.

THE Egypt Exploration Fund has just issued its third annual Report, which contains a fairly full notice of the exploration of the curious temple at Deir-el-Bahari, Thebes, a building that was almost entirely buried beneath masses of fallen earth from the sloping hills at the base of which it was erected, while this was even added to by the raised level made in later centuries, when a Coptic monastery was built over part of the buried temple. The plan of the building is peculiar, and has evidently been arranged on account of the peculiarities of the site. A wide platform, supported by retaining walls, extends in front of what is styled the middle colonnade. The latter consists of two rows of so-called neo-Doric columns of sixteen sides, capped with a square abacus. They are open in front, but at back is the retaining wall of a lengthy terrace at a higher level. Facing this terrace, and extending to the base of the cliffs, is an upper platform, in the form of an open court, having on the left a Hall of Offerings, and on the right an enclosure with massive walls, containing a huge altar formed of large masonry blocks, open to the air. To the left of the middle colonnade is a curious shrine, dedicated to Hathor, while to the right is one of the most interesting of the portions cleared. It is a spacious hall of three ranges of columns, each four in number, the front row ranging with those of the colonnade. Its flat stone roof remains in part. Behind it is a three-chambered shrine of Anubis, and at right-angles is a long line of single columns, with a retaining wall behind them backing on to the cliffs. Four rock-cut chambers with built ceilings in the form of pointed arches open from it. This colonnade appears never to have been completed. The work, judging by a good plan which accompanies the description, is set out with great regularity and system, and it may be noted that the angles of the principal buildings, and those of the great altar, are directed very nearly to the cardinal points, rather than the axes being so arranged. Interesting details are given of objects found, of the various sculptures on the walls, and of their partial obliteration during a later dynasty, and three good photographs of the portions cleared give a fair idea of the difficulties that had to be encountered, and of the design of the buildings. The account of the researches by the Society, which is by M. Naville, is followed by another on the progress of Hieroglyphic Studies and kindred matters during the year by the editor; while Mr. Cecil Smith contributes a record of Græco-Egyptian Antiquities, Mr. Kenyon another on Literary Discoveries in the same field of inquiry, and Mr. Crum concludes with notes on Coptic Studies.

THE date for the opening of the Imperial Houses of Parliament at Berlin has again been postponed, this time owing to the resignation of Chancellor Caprivi. December 5 is the new date. In the meantime the Emperor continues giving expression to his dissatisfaction with Herr Wallot's work in a most forcible manner, whilst the artistic bodies do everything to show their appreciation of the architect's efforts. The distribution of the Government Gold Medals which are annually awarded at the Berlin *Salon* has to be submitted to the Emperor's approval, the Prussian Royal Academy acting as assessors. Herr Wallot was to be the recipient of one of the "first" medals, but the Emperor has struck his name off this list and put him down for a minor distinction; a lady-painter, Mrs. Parlaghi, is to have the medal instead. This lady is the same Court favourite whose works were but lately refused by the hanging committee and then exhibited by Royal command. According to the Berlin local press Mrs. Parlaghi was to have had a small exhibition in one of the rooms of the Prussian Royal Academy, thanks to the Emperor's patronage. The authorities (to their credit) have, however, apparently refused point-blank, and the Emperor has now had to order the curator of the National Gallery to make room for the favoured pictures. This may be all very amusing for outsiders, but it must be rather irritating to German architects and artists.

IN the obituary notice of the late Mr. Walter in the columns of the *Times* it is stated that Mr. Walter was the architect of his own house, Bearwood, and of the new offices of the *Times* which "face Queen Victoria-street with an imposing front"(!). If it is really supposed in Printing House-square that this warehouse front is a specimen of architectural design, and justifies the assertion that the late owner of the paper had "a very marked capacity for architectural design," we need no longer wonder at the kind of hereditary indifference to and ignorance of architecture which has so long characterised the *Times*, or at the prominence given in its columns to Lord Grimthorpe's swaggering absurdities on the subject of architecture. In this respect he and the late proprietor of the journal must have been kindred spirits. In regard to Bearwood, it has always been understood that Professor Kerr was the architect; and if we are not mistaken, an elevation or perspective view of the house, as his design, was exhibited a good many years ago under his name either at the Royal Academy Architectural Room or at the "Architectural Exhibition" which was the general medium for the exhibition of architectural designs before the Royal Academy Architectural Room was instituted. However this may be, the claim of architectural nobility for the street-front of the *Times* offices is something too absurd.

THE dispute between the Corporation of Sheffield and certain house-owners in a street which has been sewered by the Corporation, as to whether the house-owners ought to contribute to the cost of the sewer under the special circumstances, has been brought before the Court of Appeal. The point was that the houses in question were already connected to drains at the back, and did not need a sewer in front, except for rain-water and some slop discharges, and that therefore they were not called on to pay for the making of anything except a 3-in. drain for this purpose. The Corporation objected to any interference with their general scheme of sewerage, but the stipendiary magistrate of Sheffield appears to have held with the defendants, that the Corporation had no right to charge them for sewerage work which was unnecessary to them. The Court of Appeal upheld the magistrate's decision, and thought the case was one which ought not to have been brought into either Court. We are by no means sure of that. The Corporation were unquestionably quite right in not wishing the completeness of their sewerage scheme to be interfered with, and the refusal of the defendants to contribute to the length of sewer in their street may become a precedent that will be made use of in a manner prejudicial to the sanitary work of the Corporation in the town. We cannot by any means understand the rather contemptuous tone of the learned Judges, which appears to us to have arisen from an imperfect comprehension of the real bearing of the case, and its possible effect on sanitary work in Sheffield.

IT is proposed to form an association of cement manufacturers to keep up the quality of manufacture of English cement.

In a circular which has been issued to manufacturers with this object, it is stated that some manufacturers of English Portland cement are largely adulterating their manufacture by the mixture of Kentish rag stone, other stone, furnace or oven ashes, disused or exhausted firebricks or other inert material, and so bringing disrepute upon the good name English cement has hitherto borne in comparison for quality with cement of foreign manufacture. The proposed association of English cement manufacturers is for the purpose of dealing with and, if possible, putting a stop to a practice so unprincipled and disreputable, and so calculated to perpetuate an injury to the trade. Manufacturers of cement have been invited to say whether they will attend a meeting, to be convened, to consider the subject.

WE have received a copy of a very useful Report by Mr. W. N. Blair, the Engineer and Surveyor to the Vestry of St. Pancras, on the question of pitch-grout *versus* cement-grout for laying wood-paving. The Report is accompanied by a great number of replies on the subject from Borough Engineers in London districts and in provincial towns, the great majority of which are in favour of pitch-grouting. Among the points stated in favour of the pitch-grouting, both in the replies and in Mr. Blair's own summary, are that it is more elastic than the cement and does not consequently tend to wear the edges of the blocks or drive them out of level; it absorbs expansion and gives way to contraction of the blocks, so that no movement is transferred to the channels, and no pressure to bear against the kerb to cause displacement; it makes thinner joints, and allows of traffic being turned on to the road as soon as the joints are run. The only objections against the pitch-grouting mentioned in Mr. Blair's report are, that it can only be made on dry material, and in wet weather the blocks have to be covered with tarpaulins, and that its cost is 50 per cent. more than cement-grouting. In spite of this latter objection, however, a motion submitted to the St. Pancras Vestry recently, "that no more pitch-grouting be used, either for wood or any other paving, until further information be obtained as to its utility," was, on the basis of the Engineer's Report, rejected by a large majority.

AFTER the information contained in the Report referred to in the preceding "Note," it is rather amusing to find on opening the Report of the Surveyor of St. Martin's-in-the-Fields (Mr. C. Mason) a marked paragraph to the effect that the creosoted wood-blocks (in Wellington-street, Whitehall, Strand, &c.) have been grouted with Portland cement and fine sand, and that this system not only ensures a cleaner surface for scavenging, but that it is expected the life of the pavements will be lengthened, "there being less concussion and consequent vibration than when laid with the joint." Thus the two Surveyors are at absolute variance on the subject; but Mr. Blair certainly produces a very large bulk of evidence in favour of his view, and we are inclined to believe it is the right one. From Mr. Mason's report we further learn that the question of lighting the streets by electricity has been under the consideration of the St. Martin's-in-the-Fields Vestry, but the scheme has been abandoned owing to its cost being greater than that of lighting them with gas. Mr. Mason mentions that the roadways of the Strand and Long-acre have been cleansed by flushing with a hose fixed to the hydrants, and that this is the most effectual method of cleansing, but that the cost of the water is too great for a further application of it. This touches on a very large subject—viz., whether, with the present inadequate supply of pure water to London, we are justified in throwing away much of it in washing streets; or rather, whether there ought not to be an attempt to utilise some special supply for this purpose, of water that cannot be used for household purposes. The possibility of a sea-water supply for street washing has been before suggested, and may be well worth considering.

IT is somewhat startling that we should have to comment on a case decided in the Admiralty Court, but that of the *John Stirling*, just decided, seems to throw some light on the future of the Manchester Ship Canal. The case arose out of a collision between a small paddle steamer, the *John Stirling*, and a large, though not a very large sea-going steamer, the *Martin*. The cause of the collision was simple: the *Martin* sheered out and so struck the *Stirling*, and the question therefore arose, was this sheering unavoidable or was it the result of some negligence on the part of those who were navigating the *Martin*? The judge held that the difficulties of navigating the Ship Canal were so great for large steamers that extraordinary care was necessary, and that if more care had been used by those on the *Martin* the collision might have been avoided. But if an ordinary seagoing steamer not of the largest size cannot go through the Canal without the most extreme caution, must crawl along at some four miles an hour with the danger at any moment of sheering out and so sinking another vessel, what are the probabilities of considerable traffic? It has to be borne in mind that the mere impact of two large iron steamers is often disastrous simply by reason of their weight, that it takes much time and care to bring them through locks, and that the tendency of modern shipbuilders is to increase the size of steamers. One swallow does not make a summer, and one collision will not stop the traffic of this Canal; but it must be confessed that the facts made public by the case we refer to show that the difficulties of navigation in the Canal are greater than were supposed, and that it is quite certain that shipowners will not be very eager to allow their ships to enter it.

THE case of Wright *v.* Henessey, which came before the Queen's Bench Division last week, though of some importance, must not be regarded as containing definite judicial dicta. The application was one to continue an injunction, obtained by the plaintiff in the Vacation, until the trial of the action. The first part of the injunction was to restrain the defendant, who is Secretary of the National Association of Operative Plasterers, from attempting to induce persons who had entered, or who should hereafter enter, into contracts with the plaintiff to break them. The second, and quite separate head, was to restrain the defendant from inducing men employed on some work of the plaintiff from going on strike. The defendant agreed to give an undertaking as to the first head, and the Court intimated that if he had not done so they would have continued the injunction to this effect. But, as to the second head, nothing was done, the Court considering that on this point the law is not clear. To the ordinary mind there is no great distinction between inducing persons who have entered into contracts from breaking them, and persons who are working for an employer from going on strike. To discuss the question would require space, and it is doubtful if it would have any practical result. It must suffice to note this case, not as laying down new legal principles, but as approving the law as it stands. The subject may probably come up for discussion in this very case, since there is a claim for damages which has yet to be decided; and if this should happen, further light may be thrown on this very important matter.

IT seems probable that the open view of the west front of Bath Abbey Church, shown in our illustration last week, will not remain, as John Stuart Mill would have put it, "a permanent possibility of sensation." The new Pump-Room buildings will overlap the front to the extent of about a quarter of the façade. The Local Government Board has drawn attention to this, and expressed a desire that the Town Council of Bath would reconsider the matter, with a view to setting the new buildings back, so as to leave the front of the Abbey entirely clear. We wish that this had been considered from the first, as it certainly ought to have been. But it is to be feared that the recommendation comes too late now. As the Town Council did not consider it in the conditions of the competition in the first instance, it will seem hardly reasonable to ask them at the last moment to suspend their new building and commence the plans over again, which would be the necessary consequence. The matter should have been thought of earlier.

LAST Saturday, November 3, an interesting function took place at Newnham College, Cambridge. The gates subscribed for by the past students in memory of their first principal, Miss Clough, were formally presented to the College. More than 800*l.* had been subscribed, of which 750*l.* has been expended on the gates. At the close of the proceedings the architect of the College, Mr. Basil Champneys, gave an account of the methods adopted in the design, and its technical working out. The material is a special kind of bronze, 9 parts of copper to 1 of tin, this combination giving the most appropriate combination of strength and malleability. The main stanchions on which the gates depend are of iron with a thick coating of bronze. The foundation of the design is an elaborate system of scroll-work, and the lines of these were, in all cases, determined before the clothing of foliage was added. The scroll-work is all cast in metal and then bent to the desired curves, the foliage being partly screwed and partly brazed on to the scrolls. In its general style the foliage is of the kind first introduced into England from France about the end of the seventeenth century, and of which the gates at Hampton Court are the earliest example; but these gates Mr. Champneys characterised as somewhat lacking in discipline as to design and solidity of workmanship, and cited one or two other examples as better worth study in this respect. The Newnham gates owe to these predecessors, however, little more than the type of foliage. One element also in them is conspicuously new. The subscribers had requested that if it was decoratively possible the favourite flower of their Principal—the sunflower—should be introduced into the design. This has been done by Mr. Champneys with fine effect, the formality of the sunflower border contrasting with the freer lines of the panels. The memorial inscription occupies two pear-shaped plaques, and above them the Clough arms appear on two corresponding lozenges. The design was carried out, with a skill and conscientious care upon which Mr. Champneys laid special stress, by Mr. Elsley, of Portland-road.

THE recent appropriation of the old bath, called "the Earl of Essex's bath," by the pulling down of the old house in Strand-lane, Strand, in which it was contained (for the site of the Norfolk Hotel), is likely to deprive London of a relic of the past which is both interesting and useful. The bath is supplied by the spring that fills the adjoining Roman bath. For a while it yet remains beneath the flooring of a side-kitchen in the basement of the hotel, which has been erected under a building-lease granted by the Duke of Norfolk, and will shortly be opened. We understand, however, that, failing any measures for its preservation, it is proposed to empty the bath by diverting the flow of water. In that event it will probably be filled in, or utilised in some way that will obliterate its existence altogether. We may here observe that Essex House, so-named after Robert Devereux, Earl of Essex, stood on the site of

the Outer Temple, where are now Devereux-court and Essex-street, between Middle Temple and Milford-lane, and was originally built for the Bishops of Exeter on lease from the Knights of St. John. Between Milford-lane and Strand-lane was Arundel Place, formerly the town house of the Bishops of Bath and Wells, bought for 41*l.* 6s. 8d. by Henry FitzAlan, Earl of Arundel, *ob.* 1579. Essex House had belonged for a term to Thomas, Duke of Norfolk, who parted with it to the Earl of Leicester; a portion of it remained until 1777; Arundel Place, or House, was taken down in 1678.

AMONG the personal or "one-man" exhibitions at present open, the most interesting is that of the "Facts and Fancies" of Mr. Sainton at the Fine Art Society's rooms. These are studies in water-colour, executed in a slight but very effective manner, of real or ideal female figures, the ideal subjects being mostly of the entirely symbolical class — figures representing "Aurora," the "Spirit of the Loch," "Daughters of the Gods," &c. These latter are treated mostly in a manner rather suggestive than pictorial; they are visions of figures which keep a dream-like colour and consistency, as of partly aërial beings. In this respect the "Daughters of the Gods" (18), the largest work, is a pleasant poetical suggestion for decoration; in a decorative sense there is perhaps a little too much of the bunches or rolls of clouds. Some of the figures which may come under the class of "Facts," are in part studies of costume effects, such as "Carmen" (9), and "Folly" (3), the latter a very clever sketch of a masked girl in a fantastic male costume, though not free from a touch of vulgarity. Mr. Sainton is a capital draughtsman, but his colour is rather showy and inharmonious at times, and spoils his conceptions. Thus "A Pastoral Scene" (14), is far more attractive in its colourless form as an etching, in which it is a charming classic fancy; in the water-colour, it is spoiled by the disagreeable colour. In the same gallery are exhibited a collection of water-colour drawings in India and Egypt, by Mr. Reginald Barratt, which ought to interest architects. They are chiefly of architecture, which Mr. Barratt treats with forcible colour and correct and careful drawing. Some of the drawings of the Cairo Mosques are especially good, the Toloon Mosque (33) is admirable. The Indian subjects include a good many buildings well-known to fame, with other very interesting bits which are not in the books. At Messrs. Dowdeswell's are some "Studies in English Weather," small water-colour sketches of landscape effects, by Mr. J. H. V. Fisher, some of which are interesting, and a rather larger and more multifarious collection of figure and landscape studies, by Mr. Frank Richards.

THE death of Mr. P. G. Hamerton, recorded in another column, is a great loss to the world of Art and Letters, for he was a writer who combined a great charm and individuality of literary style with a keen insight into art. His early intention was to be a painter, and in "A Painter's Camp in the Highlands" (1862) he gave a graphic description of his experiences in the cabin which he had built in the midst of a moor, to watch and study minutely the effect of the landscape under all conditions of light and weather. In spite of this genuine and earnest application, he entirely failed as a painter, and even in his invaluable book on etching the only weak points are the few of his own etchings introduced. But as a writer he has thrown great light on Art; he had the power of imparting to others his own enthusiasm, and he hardly wrote a sentence which was not interesting from the writer's earnestness and his picturesque literary style combined. For many years he edited the *Portfolio*. Among others of his works may be named the life of Turner, for the French series of "Artistes Célèbres" (1889); "Paris in Old and Present Times"; "The Graphic Arts" (1882); "Round my House," notes on conditions of rural life in France (1876); and "French and English," one of the best and most true and comprehensive comparisons of English and French life and character that has ever been made, and well calculated to help each nation to understand the other. As an Englishman resident for many years in France, he had peculiar opportunities for making such a comparison. As a contemporary writer on art he comes next in literary force to Ruskin, and his judgments are a good deal more reliable.

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS:

PRESIDENT'S ADDRESS.

THE opening meeting of the members of the Royal Institute of British Architects for the present Session was held on Monday last, at 9, Conduit-street, Mr. F. C. Penrose, F.R.S. (President), in the chair.

The President announced that at the Statutory Examination held in October a certificate of competency to act as District Surveyor under Local Authorities had been granted to Mr. F. B. Andrews (Associate), of Birmingham.

Mr. W. H. White (Secretary) announced that the following gentlemen had been admitted to candidature:—As Fellow: Edward Ingress Bell, of London (Associate); as Associates: Walter H. Baker, Wrexham; Eustace G. Bird, Ontario; Harry Jefferis, Haverstock Hill; Robert J. Thomson, Furnival's Inn; Alfred W. Toynton, Bloomsbury; Harry Harrington, Royal-avenue, S.W.: as Hon. Associates: Alfred Gilbert, R.A., Maida Vale; W. B. Richmond, A.R.A., Hammersmith; F. G. Hilton Price, Director of the Society of Antiquaries; as Hon. Corresponding Members: Emerich Steindl, Professor of Architecture (Mediæval) in the Royal Polytechnic, Architect of the Houses of Parliament, Budapest; Alois Hauszmann, Professor of Architecture in the Royal Polytechnic School, and Architect of the Royal Hungarian Court Palace, &c., Budapest; Charles Buls, Burgomaster of Brussels; Henri Edouard Naville, D.Ph., D.Litt., *Correspondant* of the Institut de France, Dalaguy, near Geneva; Barr Ferree, B.Sc., University of Pennsylvania, New York.

The President then delivered the following address:—

In the Opening Address of the President in former years you have naturally expected, and have not been disappointed in receiving, a general account of the state of the Institute and of its undertakings, especially during the interval which had elapsed since the previous Annual Address. One of the subjects dealt with in the last Address concerned the commencement and the early stages of the *Journal*. Now, however, the *Journal*, which has become a great success, stands in no need of Presidential encouragement, so that it is neither necessary for me to say anything in its favour—unless it be to thank those engaged upon it for the great trouble they have bestowed upon the work; nor is it necessary for me to dilate upon the affairs of the Institute, which are chronicled in its pages both more freshly and better than I could hope to tell them. A few points only seem to invite mention. I think I may say, without any exaggeration, that the Institute has continued to gain both in position and influence. As to the gain in members, without reckoning most welcome support given us by the allied societies, if we compare the numbers, I will not say sixty years ago—a date of which we were most agreeably reminded in July last—but taking fifty years ago, the increase is remarkable enough to be worth mention. The class of Fellows numbered at that time but little over 100; there are now more than 600. There were then some eighty Associates only; now there are nearly 900—and this notwithstanding the barrier which has been surmounted by most of the later members—namely, the Examination.

I think it is now generally recognised that the Examination in Architecture has fully justified its establishment; at any rate, it has become a great fact. And it seems important for me to call attention to this point—namely, that the present month brings the former and partly tentative arrangement to a close, and from henceforward begins the system of progressive examinations, the details of which will be found fully set forth in the recently-issued Kalendar. I consider that these examinations cannot but have an excellent effect—first, and directly, in securing to our future members the reputation of having satisfied a certain standard of proficiency; secondly, and indirectly, by excluding from the Institute in the first instance, and by reaction from the profession at large, young men whose abilities would be more advantageously directed towards the pursuit of some other calling. Some excellent remarks on this head have lately been made by the President of the Architectural Association in his inaugural address to that body. A summary of the examinations of the past official year gives the following results, namely:—

(1.)—In the Preliminary Examination 165 attended. Only 1 was "plucked," 28 were relegated for a term, and 136 passed.

(2.)—In the Intermediate Examination 55 attended. Not one was rejected, 19 were relegated for periods, and 36 passed.

(3.)—In the Qualifying Examination 176 applied, but only 150 attended. Three were rejected, 84 were relegated for periods, and 63 passed.

We welcome also the signs of useful examinations in building construction inaugurated by other bodies. The revived Guild action of the City Companies—to use the term applied to it by Mr. George Shaw, late Master of the Worshipful Company of Plumbers — is a circumstance favourable to sound execution. I have had pleasure in following in the steps of your former President in assisting at examinations conducted by the Worshipful Company of Carpenters.

I cannot leave this subject of membership without reminding you that the Charter declares the Institute to consist of "three classes of subscribing members, namely, Fellows, Associates, and Honorary Associates"; and though both the Fellows and Associates are steadily increasing in numbers, the Honorary Associates have been allowed to dwindle from 115 in 1878 to 60 in 1894, a decrease of nearly half—due, I am inclined to think, to a misunderstanding of the objects and principle which dictated the establishment in 1877 of this class of members. Honorary Associates are defined in our Charter as "persons not professionally engaged in practice as architects," but "who, by reason of their position or of their eminence in art, science, or literature, or their experience in matters relating to architecture," may "render assistance in promoting the objects of the Royal Institute"; and a by-law fixes the annual subscription of an Honorary Associate at a minimum of two guineas, with an entrance contribution of two guineas, which is paid forthwith into the Library Fund. Now some have thought that under such circumstances the title of Honorary Associate is anomalous, because the term "honorary" should imply that such member is not a subscriber, and therefore no efforts are made to increase this class of members; but the term "honorary" ought not to be defined in so exclusive a sense. The French Royal Academy of Architecture, founded in 1671 by Colbert, consisted of three classes of members: Academicians, who were architects; Honorary Associates ("Les Honoraires Associés Libres"), who, without professing architecture, were distinguished by their knowledge of that art or those relating to it; and of Associates or correspondents, both native and foreign. The title "honoraire" was used in the sense of our word "lay," or of the French word "libre," and it is in that sense we define it, and according to its true etymology, in the sense of conferring honour. The words of admission of Honorary Fellows in our universities are "*In honoris causâ.*" Moreover, we do not look upon our Honorary Associates as merely ornamental appendages who give us the encouragement and honour of their names, but are not expected to take any part in our proceedings. They form part of the electorate, and have the power of voting for the Council and the Standing Committees, and at the general meetings on all matters except professional points and the admission of candidates, and we look to them for helping to spread a knowledge of architecture among all classes of the educated community. I am convinced that the development of this class of non-professional members will greatly enhance the usefulness of the Institute. We should wish to enrol in our Honorary Associate class many more painters than are now in its ranks, a large number of sculptors, engineers at home and abroad, the masters of the great crafts, and the more prominent of those thinkers and workers who, by their books and discourses, disseminate love and respect for the several arts and sciences of which the embodiment is architecture.

There is another section of membership of the

Institute, pertaining to the non-subscribing classes, which has always seemed to me to form an essentially important part of corporations such as ours—I mean the class of Corresponding Member, or Foreign Correspondent. At present the majority of such members is distributed over France, Germany, and Italy. We have two in Denmark, two in Sweden, two in Spain and Portugal, two in Greece and Turkey, three in Austria, four in the United States of America, five in Belgium and Holland. Now I want to see Austria and Hungary largely represented in our ranks; and it is gratifying to know that two of the most distinguished architects of Budapest—a magnificent city of which too little is known in this country—are nominated for election. I should be glad also to see Austria at least as fully represented among us as Italy is; and I hope that the increasing popularity of Spain as a resort for study among the students of the Institute may lead to an exchange of ideas, a reciprocity of knowledge, between the architects and students of the respective countries. Most, if not all, of the greatest European architects and archæologists have been correspondents of our body, and even in 1842 they were fifty-five in number; while at present, after the lapse of half a century more or less prosperous, we have only forty-nine. But, worse, a startling omission occurs in this list: the architects, archæologists, and similarly learned men of Russia are absolutely without a representative among us. A few years ago we possessed Constantine Thon, Professor Strohm, and Professor Resanoff, and in 1842 there was Alexander Bruloff, of the St. Petersburg Academy of Fine Arts. Some attempt, I think, should be made to renew the ties of confraternal association which have existed, and which ought always to exist, between the architects of the mighty Russian Empire and ourselves. There never was a moment when such a reunion could be attempted with more chance of success than now. Indeed, Lord Rosebery—who, in the patriotic speech he delivered in Sheffield at the Cutlers' Feast, in which I had the honour to participate as your representative, expressed the unanimous feeling of this country toward the dying Tsar—cannot desire to retain relations of friendship with the whole population of Russia more heartily than we do with that small portion of it composing our own profession. Whilst recalling my visit to Sheffield, I must not omit to mention the kind reception I met with there from the members of our allied society.

The London Building Act, 1894.

I have almost completed the observations I wished to make upon what may be termed the personal affairs of the Institute. But there is one point to which I think your attention should be directed. I allude to the present position of District Surveyors in London.

A new Metropolitan Building Act has passed the Legislature, with so many new provisions that it seems to require much study on the part of those who have to enforce it as District Surveyors or to obey it as architects. For some of the enactments, at any rate, we may be thankful; I refer particularly to those which impose limits—lofty enough, indeed, but still limits—to the height to which houses may be carried both in front and back. For amendments in many provisions of the new Act, made after long and careful consideration, the Metropolis is largely indebted to our Practice Standing Committee, as also to Mr. Arthur Cates, Mr. Rickman, and Mr. Edwin T. Hall, who, with representatives from the Surveyors' Institution, attended a prolonged conference on parts of the original Bill with the London County Council. I will not, however, enter into the subject further—indeed, it would be premature to do so, as the Building Act is only just published. Valuable comments on leading points have already appeared in the building journals. An abstract of the Act is being prepared by our Fellow, Professor Banister Fletcher, and will be published in a few weeks, and I have more recently learnt that another work of the same kind, by Mr. H. H. Statham, is expected to be published at the end of the present week. Under this measure—the London Building Act, 1894—which comes into force on the first day of next year, the Institute still remains the examining body for granting certificates of competency, without which no person can become a candidate for the office of District Surveyor in London. This statutory examination, until the present County Council imposed a condition that a District Surveyor shall not practise as an architect, was always well attended, and those who presented themselves for examination were generally men who had not only received the education of an architect, but had practised as such. Not long ago this statutory examination was held quarterly, and the Examining Board had then much to do in order to finish the oral part of the examination on one day. But now, very few persons apply to be examined, and during the last official year the two examinations announced to be held did not take place, owing to the want, or perhaps the paucity, of candidates. Yet a District Surveyor, if he is to do his duty by the London Council who appoint him, as well as by the architects whose buildings he has to inspect, should have that knowledge of architectural science or building which can only be acquired by an architect who has been engaged for, say, seven or ten years in the active practice of his profession.* I will not go into the question whether a District Surveyor ought or ought not to be allowed the right of private practice, but I am certain that he ought to have practised as an architect before attempting to fulfil the duties of a District Surveyor under the London Building Act. Is there, then, anything unreasonable in the thought that the London County Council would be wise in including among the conditions of such appointments the proviso that every candidate for the office of District Surveyor in London shall have previously qualified for admission to the class of Associates of this Institute, and have either passed thence to the class of Fellows or have become admissible, by length of practice, to that class?

Three Thames Bridges.

We have lately seen brought to completion by our Honorary Associate, Mr. Wolfe Barry, a great engineering work with which the late Sir Horace Jones was originally associated as architect. If he had lived to superintend the completion of the design of such parts of it as lay in his department, he would, probably, have left the towers more massive than they are. It is, indeed, greatly to be wished that association between architects and engineers, in cases where their provinces overlap, were more frequent than it is. I well remember Professor Cockerell regretting a lost opportunity of the kind in the case of Waterloo Bridge. Sir Robert Smirke had offered his assistance to Mr. Rennie in profiling and adjusting the Doric columns which formed part of the engineer's design; but the latter declined. The baldness of those columns is a serious defect to the beauty of the bridge, which, indeed, would have been handsomer if the columns had been omitted altogether; and one of the good results of the Tower Bridge is that it relieves the necessity of tampering with the noble simplicity of London Bridge.

The Wembley Park Tower, &c.

In contradistinction to works which are satisfactory for their actual or hoped-for achievement, I feel called upon to mention one, of which the stoppage would, it seems to me, be matter for congratulation; and to express the hope that no further progress may be made with it, unless it be to convert what already has been done into something far less pretentious than the original intention, calculated to spoil the scale of everything else for miles around it. I need not explain to anyone here present that I refer to the incipient structure of the huge steel tower at Wembley Park in the north of London. Possibly, if its lower story were turned into something of the nature of the hanging gardens of Babylon, it might be an interesting and unobjectionable structure; but if the original scheme is to be carried through, you will, I think, agree with me in wishing confusion to a new Tower of Babel.

Again, with regard to another point, which is not, I fear, so much attended to as it ought to be. It cannot be too strongly insisted upon that in the case of old buildings of established architectural merit, when new buildidgs are erected by their side, the utmost care should be taken that the new works do not injure the effect of the older. I think many of us must have been often much pained in witnessing such injurious treatment of old venerated monuments. I am particularly thinking of the case which our late President so much and so eloquently lamented, namely, the new buildings of King's College abutting with such small consideration against Somerset House, notwithstanding the most laudable attempt of our Council to prevent its being done. Another case of the kind has occurred, but not so recently, at Exeter. There was, till comparatively lately, as in the case of several of our cathedrals, immediately contiguous to the west front of Exeter Cathedral, a small church of no remarkable architectural value certainly, but which by its very smallness gave valuable scale to the cathedral. At a later visit I found it had been replaced by a church of much larger proportions, and the merit with reference to the cathedral which its predecessor had was entirely lost. In my opinion, though the wants of the parish may have required the enlargament of the church, there was no occasion for the architect to have so raised the tower and spire as to overtop the venerable cathedral.

Architecture: a Profession or an Art?

I shall not attempt to meddle with the controversy which some time since was raised as to whether architecture is an art or a business. The two elements are no more separable than are faith and works; and our teaching to students properly takes cognisance of both. To the Art element, and the thoughts more immediately connected with it, I propose to confine myself in what I have still to say to-night.

The Threatened Destruction of Philæ the Beautiful.

The original sources from which we derive our art must always have an intense interest for us, and whilst we are in hopeful expectation of new light being thrown upon Greek archæology from the researches of the French architects at Delphi, under the experienced and skilful guidance of M. Homolle, the Director of the French School at Athens, we are not indifferent to grievous tidings which come from Egypt—a strange proposal which, having been more or less vaguely in the air for some time, has recently assumed alarming consistency. I refer to the proposed Nile barrier, to be built across the river at Assouan for the purpose of storing up the waste waters of the annual inundation in a huge reservoir, in such a manner as to submerge and ruin a series of the most beautiful and interesting remains in the country. The *Journal* has contained two or three valuable papers on the scheme, particularly one by M. Naville in the August number, but the subject is so important and interesting that it seems to demand some mention here. The deluge which is threatened would extend from Assouan as far as Korosko, a distance of fully one hundred miles, forming a lake of which there would be no parallel in Europe, submerging the Island of Philæ, with its celebrated group of temples of the highest beauty and artistic value, and eleven or twelve other important sites, particularly the fine and very perfect temple at Kalabsha. In addition, moreover, to what we know would be lost, it should be noticed that, as the region of Nubia in which they occur has not been so carefully examined as most other parts of ancient Egypt, it is more than probable that many objects which would otherwise reward future exploration if they remained, as now, accessible, would be lost for ever. Again, if anything happened to the dam, what would be the fate of Lower Egypt, and all its inhabitants and all its treasures? We need not fear but that the engineers would do their best to make it secure; but sad instances of the failure of reservoir dams, where everything ought to have been well constructed, are not unknown to us, and the region has been subject to earthquakes so violent as to throw down even Egyptian structures.

The proposal has, unluckily for one point of view, much that is tempting to utilitarian minds, and we are not, as a nation, exempt from the reproach of yielding in cases where men of business have had to choose between sentiment and prospective gain. In the case of the Nile barrage, we must do the Egyptian Government the justice to say that they would seem to deplore the injury to Art and History which would follow; but the premium which is held before them is so large that we may feel sure that any attempt to oppose an absolute negative to the scheme would be simply futile; nor would it be right. Our own Government, again, is doubtless in no enviable position in the matter. If by an exercise of power we were to prevent the work from being undertaken, it is easy to see what a deep, and maybe dangerous feeling of disappointment would arise in Egypt; whilst, if they consent to it, our rulers, both at home and abroad, would incur much obloquy. As for the Island of Philæ, it is true that a scheme has been proposed for lifting up the remains above the surface of the reservoir; but it can hardly have been proposed seriously. It would be ruinously expensive to do it at all adequately, and would quite destroy the value of remains now perfectly adapted to the island on which they stand. Practically, the attempt, if made, could not fail to be worse than sub-

* These remarks surely cannot be applicable to the future position of District Surveyors. At all events, there is not the slightest hint in the new Building Act about forbidding the District Surveyor to practise as an architect; in fact, there is a special section (114) to meet the case when a District Surveyor has to deal with a building erected by himself in the course of his private practice. The "Superintending Architect" is forbidden to practise, but not the District Surveyors.—Ed.

mergence. It has been also suggested that a dam of less elevation, placed above instead of below the Island of Philæ, would for a long time answer all legitimate demands for water storage, and would involve a much smaller sacrifice of valuable antiquities or disturbance of inhabitants; and if at some future time the demand should arise for a larger supply, other means not now available—new sites, for instance, above Wady Halfa—might be found. We may, at least, hope for the escape of Philæ and some other of the Nubian antiquities, and this gradual method of procedure would seem to fit in with the expectations of the proposers of the barrage, for the supposed profits on which the scheme is based are not to flow in at once, but, as Mr. Garstin, Under-Secretary of State for Public Works in Egypt, himself says, the *great expectations* are founded on an eventual increase "which it will take years to arrive at." On this subject I would draw your attention to a pamphlet printed by the Society for the Preservation of the Monuments of Ancient Egypt, in which a more gradual method of water-storage is strongly advocated.

As regards the main proposal of this barrage, we have, indeed, no resource but hope; and in this I am encouraged by the remarks of our distinguished Honorary Associate, Sir John Fowler, who presided at a recent meeting of the Egypt Exploration Fund, when he took occasion to state that there was now little danger of the destruction of Philæ; that further inquiry had shown that the material necessities of Egypt and the claims of archæology were capable of reconciliation. There is, however, another aim; which we need not relegate to the transcendent, but also transcendental, virtue of Hope. And towards this you have taken a valuable step by appointing, through your Council, delegates to a conference in which the Royal Society, the Society of Antiquaries, the Society of Dilettanti, and the Hellenic Society and others, are represented, for considering the best manner of instituting a thorough survey, architectural, archæological, geological, and physical, of the district the submergence of which has been threatened. This conference was initiated by the Society for the Preservation of the Monuments of Ancient Egypt.

Old and New Methods of Design and Practice.

Turning homewards, it may be useful to institute a comparison between some of the results of architectural work of the present, as compared with an earlier period in this country. In making this comparison we must not lose sight of the great differences in the two periods, both in respect of the demands upon the architect and of the materials available to his hand. The greater complexity of the conditions of modern life is unfavourable to the modern architect in some respects. It requires him to spend a large portion of the funds available for a building in work which, however important, can produce no æsthetic effect, and the many calls upon him to satisfy a variety of wants must necessarily make it very difficult to secure that charm of simplicity and proportion which is an essential ingredient in work of the highest quality; indeed, with so many importunate claimants for attention, the time which must have been devoted to rhythm and harmony by the older architects can now seldom be spared. There is, therefore, a great temptation to accept a premature solution of the problem, provided the requirements of the plan appear to be satisfied, and provided the resultant grouping, however haphazard it may be, accords with some ideal of picturesqueness which natural or acquired taste can generally secure. I do not, however, venture greatly to blame this result. It is far better that a good plan should command the obedience of the elevation than that a preconceived symmetrical elevation should force the plan into inconvenience. Nevertheless, a more excellent way is almost always possible where the plan shall still rule, but with all the difference between marching order and broken ranks; and, as I said, it may require more time for working out than can be spared in any particular case. Genius has been defined as the power of indefatigable study. Such genius is indeed very necessary for the highest achievements of architecture. There are certain buildings, such as club-houses, theatres, town-halls, and, above all, ecclesiastical structures, which lend themselves much more than others to be treated by the rules of Art; but there are none, not even the most humble, which may not be improved through study with an eye that loves proportion. It is a duty the profession owes to the public to do this on every possible occasion.

To return to my comparison between the older and later architectural works. There is a point which seems to be deserving of attention, but whether it admits of being to any great extent brought into operation I do not venture to say. The modern architect, owing to the way in which drawings, specifications, and bills of quantities are prepared, and the exactness with which contract works are expected to follow out those documents, has seldom if ever the same freedom in studying his design as it develops itself, and in making improvements which suggest themselves as the work goes on, that our predecessors had two hundred years ago. The designs made by Sir Christopher Wren for St. Paul's Cathedral underwent great changes during the progress of the building, as there are many extant working drawings to show. Some liberty, of course, we have by the usual conditions of contract, but the greater rapidity of modern construction, and the fear of additional cost to the employer, limit considerably the free use of these conditions; and this want of elasticity, so to speak, in availing ourselves of opportunities offered by the study of our works whilst in progress is one of the points on which the older architects had a great advantage over us.

A Permanent Gallery of British Architecture.

Let us now compare the works of some of the older with those of more recent architects. But before doing so I would urge upon those in whose hands rests the power of developing the means of architectural study to consider the possibility of forming a permanent exhibition of drawings representative of English architecture. The suggestion, indeed, is not new, nor is it mine; but I have received a letter on the subject from our Fellow, Mr. W. Howard Seth-Smith, which is so much to the point that I propose to read a portion of it. He says:

"If we are to look for real and permanent progress in architectural design, we must in some way create public interest and enthusiasm for beautiful building. A permanent exhibition would be the very best means of gaining public interest in our art. It is the galleries which have made art more popular. It may be true that the public do not understand geometrical drawings such as are annually exhibited for three months in one small room at Burlington House, but there is a very considerable and increasing number of persons sufficiently interested in architecture to appreciate keenly, and to compare critically, the merits of buildings if represented by photographs and other perspective views.

It is on the face of it unfair to subject an exhibition of architectural design (largely geometrical) to competition with a mass of popular pictures, as is the case at the Royal Academy; but this is the only opportunity existing in London for a person to watch the progress of English Architecture. While the amateur's opportunities are confined to the ancient buildings themselves, his prejudice against all modern work is likely to be as invincible as it is unreasonable, and therefore fatal to progress. Nor is he, as a rule, capable of studying modern work profitably by perambulating the streets; his knowledge will be too small to enable him to distinguish the good from the bad. The choice specimens (alone worth the attention of the student) are, with few exceptions, scattered too widely or hidden too deeply amid this utilitarian wilderness of London to make this practicable.

I would propose that a permanent exhibition be organised of most carefully-chosen architectural illustrations of the best ancient and modern designs, classified under all the great divisions of building, such as Civil, Ecclesiastical, Domestic, Scholastic, &c. There should be one department for photographs of selected ancient work, chronologically, and topographically arranged and carefully described. This would supply the urgent and often-expressed want of an illustrated lesson on the characteristics and developments of the great architectural epochs and styles of the past.

Such an exhibition would at once be popular among the rapidly-extending connoisseurs of art, would be patronised by persons of enterprise and intelligence desiring to build, and would doubtless be largely visited by Americans and other foreigners."

I certainly consider Mr. Seth-Smith's proposal one of great importance. To be of any service it would require to be carried out in an effective manner, and if this could be done, it could not fail to be advantageous both to our profession and the public at large.

Returning to my proposition before stated, the list of the architects I propose to refer to begins with the two greatest names on our record, namely, Inigo Jones, who practised in the reigns of James I. and Charles I., and Sir Christopher Wren, who practised in those of Charles II., James II., William and Mary, and Queen Anne.

Inigo Jones.

Inigo Jones had settled at Copenhagen, and the King of Denmark's sister, who married our James I., brought him back to his native country. He then travelled for further study in Italy. The beautiful fragment at Whitehall is, as you know, only a small portion of the magnificent palace which he designed for King James, preserved to us, no doubt by the liberality of Lord Burlington, in Kent's fine edition of Inigo Jones's works. Besides the Banqueting House, there are but comparatively few remains of Inigo Jones's buildings in London. We have lately lost a very interesting work of his in Lord Shaftesbury's house in Aldersgate-street, which was taken down about ten years ago. It had already suffered much, but was still a noble fragment. There is also the much-mutilated east front of St. Paul's, Covent Garden, and the Piazza on the north side of the market; and there is the Water-gate at the bottom of Buckingham-street. This gate, although it retains its beautiful proportions, has lost much of its interest, now that it no longer gives access to the river; but its preservation under any circumstances is a thing to be grateful for. A house on the west side of Lincoln's Inn Fields still shows the handiwork of Inigo Jones. Ashburnham House, Little Dean's Yard, Westminster, built by him, has been much altered, but there are remains of his work in the interior. There are probably a few others, but a good deal has been attributed to him on insufficient grounds.

Wren's Principal Works.

Sir Christopher Wren's first work of any importance was the Sheldonian Theatre, Oxford, designed by him in 1664—a building which still admirably answers the purpose for which it was constructed. At this time Wren was busied with various designs for altering old St. Paul's, which had survived in a very ruinous condition the ill-treatment of the sixteenth century and of the Commonwealth. The Great Fire in 1666 put an end to all attempts to repair and alter it, and made a new building necessary. I am not intending to dilate upon the existing cathedral, which you all know so well, and in which there is so much to admire, but I should like to call your attention to a design which is even more distinctly Wren's than the existing cathedral. I refer to his first and favourite design, for which an elaborate and large scale model was prepared. This model still remains, though, unhappily, it suffered from neglect during many years, and I am glad to be able to inform you that it is undergoing restoration, though progress is necessarily slow. It is, however, in quite a sufficient state of preservation to enable Sir Christopher Wren's merit to be fully appreciated. We have here, by Mr. Goodchild's kindness, two splendid drawings representing the interior of the cathedral as it would have been if Wren had been allowed to execute this design. I do not say that it competes on equal terms externally with the existing structure, especially when we consider the height of the surrounding buildings, which gives the value of greater loftiness to the adopted design. But when we consider the two interiors, the balance altogether preponderates in preference of Wren's favourite design. As for certain defects in it, which Fergusson in his "History of Modern Architecture" discusses, we must remember that Wren had not, in the case of this design, as he had in the adopted one, thirty years of study and improvement to give to it as the work proceeded; but this marvellous production was the outcome of necessarily a very rapid incubation.

The late Rev. J. L. Petit, the exhibition of whose splendid water-colour drawings at the Institute some of us may remember, in discussing Saint-Front, Périgueux, and what has been and still might be derived from it, observes that Wren—who, though he may not have known Saint-Front, must have known St. Mark's, Venice, from which Saint-Front was derived—"had conceived a design" (namely, this his favourite model) "on similar principles, which, had it been carried out, would have given his cathedral the noblest interior in the world."* I commend the whole passage, and, indeed, the whole book to your study.

It is evident that Sir Christopher Wren's designs embodied the result of much study and many approximating revisions in preliminary sketches, carrying out in this the precept of Horace, "*Sæpe stylum vertas*," which may be familiarly translated "Use your indiarubber freely"; and when the final result was attained, I believe we shall always find that he considered rhythmical proportions as essential to completeness in architectural design as they are to poetry. I find the same thing in the two buildings of Sir Christopher's I have chiefly studied—namely, St. Paul's Cathedral and St. Stephen's, Walbrook—and I have no doubt it obtains also in his

* "Architectural Studies in France," p. 78.

lovely creations of Bow steeple, St. Vedast, St. Martin's, Ludgate, and others of his works, which possess admirable qualities of elegance combined with simplicity.

Wren's Pupils and Followers.

The most conspicuous of Wren's followers were his pupil and assistant, Nicholas Hawksmoor, and Vanbrugh and Gibbs, to whom may be added, as an associate, Dean Aldrich, who built the church of All Saints, Oxford, and the Peckwater Court of Christ Church, in a style much in harmony with that of his friend, Sir Christopher Wren. The three first-named have left stately monuments. To mention only one work of each: Hawksmoor has given us, in his church of St. George, Bloomsbury, a monument worthy of the classical feeling he had imbibed from his master; James Gibbs, in his church of St. Mary-le-Strand, a work of great elegance, which I select from among his other buildings for the purpose of recording the gratitude due to our late President for the zeal and pains he displayed in its restoration a few years ago, when its demolition was threatened by the utilitarians of the day; and Vanbrugh at Castle Howard, a noble pile, more pure than Blenheim. Vanbrugh, however, failed to impart—as Wren did—sufficient elegance to his powerful masses.

The above-named arthitects represent in date the middle of the seventeenth and the dawn of the eighteenth century, and they are the authors of standard works with which it is hard for the modern schools to compete. The middle and end of the eighteenth century witnessed performances many of which were not wanting in dignity, but they offer a less uphill match to our own time. We must, of course, accept a common ground of comparison; for Gothic architecture was almost unknown in the eighteenth century—though an exception to this statement ought to be made in the case of the architect, Essex. Limiting the inquiry, therefore, to the revived Classical styles, the names of Lord Burlington and his friend Kent, and Kent's pupils, Flitcroft and Vardi—the latter the builder of Spenser House, in the Green Park—the younger Dance, Sir William Chambers, and James Gandon, the architect to the Four-courts in Dublin, and distinguished as being the first to receive the architectural gold medal of the Royal Academy, stand out pre-eminently. There is a simplicity and fitness for its purpose about Dance's principal works, Newgate and St. Luke's Hospital, which are worthy of being carefully noted. Sir William Chambers's great work, Somerset House, notwithstanding many effective new buildings on the Embankment, maintains its pre-eminence, and the Strand front and entrance may still be said to "hold the record" of similar combinations.

A little later in the century lived Wood, the architect of Bath, whose palatial building of Prior Park is one of the ornaments of the eighteenth century; and James Wyatt, a man of versatile genius, and Robert Adam, have left works of merit. At the turn of the century came Sir John Soane, whose most remarkable design, the Bank of England, has the merit of being thoroughly characteristic of the purpose of the building, following in this the spirit of his master, the younger Dance.

The British Architects of this Century.

When we come down to more recent times, by which I mean the first quarter of the present century, I find among the names of the architects some whom I myself remember when I settled in London as a pupil to Edward Blore in 1836. One of my first memories was the exhibition of the designs for the new Parliament Houses. They were exhibited in the rooms in Trafalgar-square, which had only lately been completed and had not yet been assigned to the Royal Academy, whose exhibition for that year was still held at Somerset House. Sir Charles Barry's design was approached by no rival. Some drawings were, indeed, sent in by Cockerell, but he had evidently not entered seriously into the struggle. Blore did not compete. So far as my judgment at that time can be trusted, the best of the unsuccessful designs was by Basevi. Besides the four just mentioned, the names I recall as the leading London architects were Samuel Angell, Tite, Hardwick, Sydney Smirke, Donaldson, Salvin; and, as a writer, Gwilt. For Sir John Soane, Sir Robert Smirke, Wilkins, Inwood, and Decimus Burton, though living, belonged to an earlier decade; Thomas Henry Wyatt, Sir George Gilbert Scott, and Sir James Pennethorne had scarcely at that time made their mark; and William Burn was just migrating to London from Scotland. I omit Augustus Welby Northmore Pugin, who, as far as the competition for the Parliament Houses was concerned, was, as it was already known, giving his assistance to Barry.

At the time to which I refer, I consider that, with the exception of Pugin, Blore was the only architect who was quite at home in the detail of Gothic architecture. The full development of the Revival had not come in, and it was the "day of small things;" but whilst we may reasonably complain of a want of massiveness for the most part in his works, there is a sense of elegance about his buildings which raises them above the level of the majority of the contemporary works of Gothic revival. There are not many of his buildings in London. The exterior of the Church of St. Thomas Charterhouse, in Goswell-road, may be cited as a good specimen, allowance being made for the decay of the Bath stone used in the decorative parts, the inability of which material to resist the London atmosphere was not so fully recognised then as it has been since.

Among the best buildings of the same period are two works by Shaw—the hall of Christ's Hospital and the tower of St. Dunstan's-in-the-West; fortunately a better stone was used in their construction.

The first place in the period which I am considering—for I purposely do not refer to the names of men who, like William Burges and George Edmund Street, attained such distinction during the second half of this century—must be assigned to Sir Charles Barry, not only on account of his great work, the Parliament Houses, in which, whatever amount of freedom in detail he may have allowed to his coadjutor Pugin, his great power of dealing with the masses was conspicuously his own. But independently of this, the Reform and Travellers' Clubs and Bridgewater House, to mention no other of his works, suffice to secure him this position. Barry was a man of extraordinary energy, of unwearied industry, and of powerful presence, qualities of the utmost importance to anyone engaged in works of such a scale as those which were intrusted to him, especially when combined with a courteous manner, of which I personally had the highest appreciation when he was on the Committee assisting Dean Milman in the works intended for the completion of St. Paul's Cathedral.

The man of greatest distinction after Sir Charles Barry was unquestionably Professor Cockerell, a name deservedly revered and honoured, whose buildings include some of very great merit. Cockerell laid the foundation of the classical expression found in his works by an exhaustive study of Greek remains, of which he was an eminent and ardent explorer, in days when such investigations were rare, and attended often with "perils from waters and with perils from robbers," in days when communications were very difficult. His fame would be considerable if it rested only on his published works. When he returned to England he entered heartily into the then fashionable Greek revival; and, so far as it was possible to adapt the limited range, not of its teaching, but of its available precedents, to modern practice, he succeeded—a claim which can be made for no other architect of our time but one, Schinkel of Berlin.

Cockerell excelled as a draughtsman, and was no mean sculptor. He himself modelled much of the ornament which he introduced into his works, and his mouldings are always examples of appropriate profile. These details, and the propriety of their subordination to the whole, in addition to the sense of harmony and proportion which prevails throughout, are objects particularly worthy of study in his works. In London the Sun Fire Office near the Bank of England, and at Oxford the Taylor Museum, are buildings which will preserve his reputation as an architect. His lovable nature—

> "Not being less but more than all
> The gentleness he seemed to be—"

is still dominant in the remembrance of those who had the privilege to know him, but their number is now greatly reduced. There are, however, not wanting here those who can remember his son, which will help them in imagining what the father must have been. His admirable lectures delivered at the Royal Academy cannot but have produced good results on those who heard them. Both in Cockerell's works and in those of Barry will be found the same qualities of proportion and subordination of ornament which are conspicuous in the works of Sir Christopher Wren and architects of his school.

Nearly contemporary with Cockerell as a Greek explorer was Donaldson, the chief pillar of the Institute at its commencement. There is not much of executed building by him to which I need draw your attention, but he was an admirable instructor; and many of our present members owe much to him from his lectures at University College. He, too, has left a long-enduring memory of a kind and sympathising nature; and, while mentioning Donaldson, I cannot but refer to the three Papworths, father and sons, the last of whom has been borne to his grave since we met in this room. The names of John and Wyatt Papworth, devoted supporters and benefactors of the Institute, must always be associated with its library; and that of the younger of the two with "The Dictionary of Architecture," for which he was a laborious worker, and the completion of which he, as its editor, happily lived to witness. I shall ask you presently, colleagues and gentlemen, to cause to be recorded upon the minutes of this meeting our sense of the loss sustained by the death of Wyatt Papworth.

To continue: Gandy Deering, himself a Greek explorer, having been engaged in that service by the Society of Dilettanti, exhibited much skill in his use of Greek elements; but for the most part the Greek revival did not, and could not, succeed, and it helped to bring on the Gothic revival, which apparently is also losing its vitality. Some good works, in which Greek detail is not so evident, were, however, produced about the same time, such as Arthur's Clubhouse, and Basevi's Fitzwilliam Museum at Cambridge—the latter being left unfinished when Basevi met his death by a sad accident in Ely Cathedral. The building was then completed by Cockerell, but the interior has been much altered since those days.

The most remarkable building of this period (if we exclude the Houses of Parliament, the style of which does not lend itself to the comparison) is St. George's Hall, Liverpool. The younger Elmes, who was the architect, did not live to finish the building; and after some delay Cockerell was appointed to complete the work. It appears that Elmes had left full instructions for its completion, but these documents had been lost or mislaid, so that when Cockerell came upon the work he had nothing to guide him but the shell of the building. The entire finishings as executed are by Cockerell's hand; but there can be no doubt that in every respect he loyally carried out Elmes's intentions so far as they could be gathered, and the harmonious result shows that he must have succeeded in practically doing so. The external approaches to the Hall were worked out and finished with great care by Cockerell; these, however, have been since subjected to considerable alteration by others.

Proportion in Preference to Picturesqueness.

I have now carried the summary far enough, and shall not particularise any very recent buildings; and for the purpose in view—that is, the comparison of what was done in the seventeenth and eighteenth centuries with the works of the present time—there is no necessity for my doing so. Carried down to the extent it has been, we have found in Sir Charles Barry's and Professor Cockerell's works the same loyalty to the principles of subordination and proportion that prevailed in the days of Inigo Jones and Wren. But, latterly, they seem to have been too much lost sight of. Both the Greek and Gothic revivals have had the effect of bringing into contempt the precedents of Palladio and the great Italian authorities; and, misinterpreted as the spirit of their rules often was, there was some reason in this reaction, for, as far as such rules were supposed to supply the place of genius and thought, they were indeed fetters instead of helpers. That genius and thought could be replaced by rules of any kind was certainly a mistaken view. Followed as Palladian precedents and principles were by men like Inigo Jones, Wren, and Chambers, as the language with which their thoughts were to be clothed, they had the same value in architecture that metre has in poetry. The licence which is now too frequently taken with forms and features long recognised as essential, in favour of a treatment of which the final aim is picturesqueness, can hardly ever produce a satisfactory effect from all points of view. I do not hesitate, however, to allow that pleasing effects do, as it were, accidentally occur; and that we do not, in streets where architects have scope allowed them, see monotonous frontages of the class of Gower-street and Wimpole-street—such as were general at the beginning of the century, though even to them some excuse must be granted. Those were hard times, when the country was struggling in a great war for very

life, and severe economy in building was then much more insisted upon than it has been of late; and had that restriction not happily been relieved, there could not have been employment for more than about one-tenth of the number who are at present enrolled in the profession. The relaxation of architectural discipline, however, was not a necessary element in the result referred to, for quite sufficient variety, and of a better quality, can be obtained by proper study without ignoring accepted precedents, or neglecting principles of still greater value—namely, proportional relations of contiguous parts and subordination of details to the purposes for which they serve and to the general effect. My predecessor in this chair insisted so well and so emphatically on the evil of redundant ornamentation, which has been common of late, that I should only weaken what he so well urged, were I to say more than that I heartily agree with every word he uttered on the subject in his last Annual Address to the Institute.

The Rev. Robert Gregory, Dean of St. Paul's, said he had great pleasure in proposing a vote of thanks to Mr. Penrose for his very interesting address. Were he (the Dean), a professional architect, he might venture to criticise some of the things that had been said, but as a layman, from the architectural point of view, he did not profess to be in the slightest degree qualified to do anything of the kind. But, at the same time, he might refer to some of the points raised by the President. In the first place, he would congratulate the Institute on the rapid increase in its numbers. The profession of an architect must either be a very flourishing one owing to the enormous number of buildings, or the average amount of emolument gained by each architect must be rather limited. A vast number of the buildings erected had no thought whatever of beauty bestowed upon them, the only idea of the people who had them built being to see how much money could be made out of them. In London they were a good deal handicapped by the enormous value of pieces of land, which increased the cost of the buildings erected upon them. Possibly the profession of an architect might come to be a good deal like that profession of which he had the honour to be a member, where there was employment for any number of people, but a livelihood for very few of them. Another remark made by Mr. Penrose, which was worthy of serious consideration, was as to the large sums of money which had often to be expended upon works that did not appear. His experience of architecture for some time past had been to a considerable extent connected with drains, and he found that a number of architects did not look after the drains until they had been constructed, while the reconstruction of such necessary portions of work, if houses were to be healthy, was a very costly operation. In the older part of London—the City—there had been a complete revision of the whole question of drains, consequently an enormous amount of cost had been put upon those living in houses where the whole thing had to be reconstructed. He had learned that the inspection of buildings by the County Council, and the persons authorised by them, did not appear to be carried out in the happiest way possible. The District Surveyors frequently seemed to be lacking in that amount of practical knowledge and appreciation of what ought to be done which was so desirable. Without speaking from the knowable point of view, even the most ignorant must feel what great improvements might be made if the recommendations of Mr. Penrose were followed out—viz., that experienced architects should be employed for the exceedingly important task of criticising the works of their neighbours, instead of those who had little or no previous preparation being set to so difficult a matter. There were just one or two remarks he should like to make with reference to St. Paul's Cathedral. In the first place, in regard to the exterior, they had been told what an admirable thing it would be if they could only wash it. Now, of all the silly things he had heard for a long time past that was the silliest. He remembered some twenty years ago the same subject being started. People then said, "If you want to improve St. Paul's, wash the external part of it. Go and see this, that, and the other buildings that have been washed." The late Dean and he took the trouble to do as they were recommended, and their feeling was that such buildings looked exceedingly like dirty streaky bacon. Anything more hideous than the effect of the water upon the stone could not be imagined, and anybody who had thought of colour or what an ancient building ought to be, would certainly reject at once the very idea of attempting anything of the sort. He was glad to find that his view was entirely in accord with those of the gentlemen present. Then with regard to the interior of St. Paul's, he had taken a very deep interest in it. When appointed to a canonry in St. Paul's nearly twenty-six years ago the first thing he thought of doing was to go to Italy for the purpose of getting some idea of what they ought to aim at. He had no knowledge of architecture, or of what should be done; but, anyhow, he then thought that if one had appreciative power they might gain by looking on some building in Italy belonging to the same school of architecture, and might sooner or later have the opportunity of furthering what was wanted. At the present time he thought they were making efforts which, he hoped, the world at large would consent to regard as being successful. He believed that, under the guidance of Mr. Richmond, they had been successful with the mosaic put up in St. Paul's, and if the public allowed them to go on with the work, as he believed there was every prospect they would, they hoped it would be brought to a satisfactory conclusion. Like most great works, however, it would be the work of years—a work of effort and of genius on the part of him who had the direction of it, and, at the same time, one of patient perseverance and of absolute assent to the proposal of the skilled man they employed. Something had been done, and a good deal had been spent, and he trusted that before very long more would be seen of it. It would take, at all events, a couple of years before they could see the scaffolding taken down to some extent out of the choir, and until then the work would appear at a great disadvantage. Then with regard to the latter remarks of Mr. Penrose, he felt it would be out of place for him to criticise them. Seeing St. Paul's, as he had done, twice a day for more than twenty years, one necessarily grew to love and admire it, and to think there was no other place to equal it. He trusted that, as long as he lived, his great desire would be to see it more and more beautified. He was rather glad that Wren's second plan had been preferred to the first, because as he looked at the earlier design it seemed to him not to be equal to that which was eventually brought to a successful conclusion. It was a scandal that a building designed to be decorated, as St. Paul's was, should have been allowed to remain without that decoration for 200 years. At the same time, it was possible that the skilled men of the present day were more able to decorate the building in the best manner than the men of an earlier period might have done. Although he was disposed to be somewhat of a *laudator temporis acti*, he nevertheless felt that the artists of the present day excelled in many important respects those who had preceded them. With regard to Vanbrugh, the one architect about whose works he did know something, whenever he saw any of his buildings he felt how true the couplet was:—

"Lie heavy on him, Earth, for he
Laid many a heavy load on thee."

The weight of Vanbrugh's buildings, rather than their beauty, was the thing that struck one the most.

Mr. Alma Tadema, R.A., seconded the vote of thanks to Mr. Penrose, whom he had often called "our great Athenian." As an Hon. Associate of the Institute, he considered it a great honour to be *en rapport* with so distinguished a body. As a member of the Royal Academy, too, he was specially interested in the subject of art education. That education he found was never thought of in the great schools and universities. Civil engineers, and others employed by the country, were not asked whether they knew anything about architecture, and such matters, but, when the time came, if they were successful, they were put on committees and judged such things quite freely. It was a pity that a scheme could not be devised, to bring that idea to bear upon those who were directing the education of the country, and it was needless to say that he was in favour of the proposal to have a museum of drawings and photographs of buildings and monuments. That would cause in the public mind a desire for the study of that art which was the greatest ever produced by mankind—that art to which painters and sculptors belonged, and which in these modern times of division of labour had been perhaps a little bit chopped up into all sorts of details. He always felt a certain pang, when hearing such descriptions of architects as Mr. Penrose had given, to think they were deprived of knowing a little more of the men to whom they owed so many of the wonderful cathedrals scattered all over the country. These men were lost in oblivion, but they were loved and admired none the less.

The vote of thanks, on being put to the meeting, was carried with acclamation.

The President, in thanking the meeting, added that it was of course impossible to make statements which would altogether run on all-fours with everybody's feelings. He then moved:—"That an expression of sympathy and condolence with the widow and children of the late Wyatt Papworth (Fellow), in the loss they have sustained by his death, be entered on the minutes of the meeting, and communicated to them." This proposition was unanimously agreed to.

The President also announced that the next meeting would take place on the 19th inst., when a paper would be read entitled "Notes on the Architecture of China," by Mr. F. M. Gratton (Fellow), of Shanghai.

The proceedings then terminated.

INCORPORATED ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS:

AUTUMN MEETING AT BUSHEY AND HAMPSTEAD.

A MEETING of the Incorporated Association of Municipal and County Engineers was held on Saturday last, for the purpose of inspecting the Colne Valley Water Company's works at Bushey, and also the Hampstead Electric Lighting station, which has been recently opened.

The members of the Association having assembled at the offices of the Colne Valley Waterworks Company,

Mr. Brough Taylor, M.Inst.C.E., read a short description of the works, from which it appears that they supply a district of seventy-five square miles, most of which lies in Hertfordshire, the smaller portion being in Middlesex. This area extends from the boundaries of two of the London water companies, up to the districts of Watford and St. Albans. The average supply is about one million gallons daily, the population at present supplied being about 45,000. The water is obtained from wells in the chalk formation, the stratum being found at the surface in the neighbourhood, and has a thickness of about 690 ft. The first well, which now forms the engine-well, was sunk in 1874, and it is stated to have yielded about 820,000 gals. in twenty-four hours when first pumped out, but the yield gradually decreased to 600,000 gals. In 1881 it was determined to increase the available quantity of water, and with this end in view a second well and deep boring were sunk and connected with the engine-well by an adit below the line of saturation, so that the overflow from the new well should run by gravitation to the old well. The second well is 43 ft. deep and 7 ft. diameter, and from this depth a bore-hole 18 in. in diameter was sunk to a depth of 477 ft., being then reduced to 15-in. diameter, and continued for a further depth of 180 ft. through the chalk marl, ultimately reaching the gault at 700 ft. from the surface. The quantity of water which this second well is stated to have contributed is 635,000 gals. per twenty-four hours, making with that obtained from the engine-well, about 1,235,000 gals. per day. When Messrs. Taylor, Sons, and Santo Crimp were first called to advise the directors of the company, they found that this figure represented not the average but rather the maximum yield from the wells, the minimum at that time being scarcely 1,000,000 gals. per day, and as the period of minimum yield in chalk wells occurs about the time of the maximum demand of the district, it was soon found necessary to increase the yield by new works. The objects his firm had in view were (1) to lower the engine-well, so as to enable them to get the suctions of their pumps further down below the line of saturation; (2) to cut the deep boring at the lowest possible level, in order to liberate the water which would undoubtedly issue when the top pressure was removed; and (3) to form a new pump-well in which at any future time additional pumping-power could be placed. These works were carried out by Messrs. Thomas Docwra & Son, and the result has been to give the company three times as much water as they had before; the available minimum supply being now well over three million gallons per diem, and the operations were carried on without any interruption of either the softening process or the supply to the district. The pumping-engine was designed by his firm in 1889, and was manufactured by Messrs. R. Moreland & Sons, and set to work in 1891, since which time it has performed all the company's pumping. It is

one of the compound beam type, with upper and lower lift pumps and surface condenser. The Lambert trip-gear is introduced into the engine. The lower pump is furnished with a bucket at bottom and plunger at the pump-head, and the upper pump is of the combined bucket and plunger type. The lower lift raises the water from the pump-well and discharges it into the softening-tanks, and the higher lift draws from these tanks and delivers its water through the pumping-main to the reservoir. The pump horse-power of the engine when running 16 revolutions per minute is 133, and at this speed it discharges 1,400,000 gals. in twenty-four hours. The steam is obtained from one or other of two Lancashire boilers, 30 ft. long and 7 ft. diameter, steaming at about 80 lbs. pressure. In reference to the process of softening water before sending it for supply, his partner, Mr. Midgley Taylor, had contributed the following account of the process, and the works required for carrying it on:—"Rain-water falling upon the earth contains practically no dissolved solid matters, and is perfectly soft, but contains varying proportions of dissolved gases, including carbonic acid, which the rain has absorbed from the atmosphere. In percolating through the strata down to the underground natural reservoirs, the water dissolves and carries with it any soluble matter with which it may come in contact; and owing to the presence of the carbonic acid gas it is capable of dissolving carbonate of lime or chalk, which would otherwise be practically insoluble. These various dissolved matters cause the hardness of water. It is apparent, therefore, that the dissolved salts causing hardness may be divided into two classes: (first), those which are soluble in water by themselves, and (second) those which are held in solution by the aid of the dissolved carbonic acid. The salts in the first class cause what is called permanent hardness, and those in the second temporary hardness, or that which can be removed by the expulsion of the carbonic acid, as in boiling, or by its absorption, as in softening. The chief salts which have a hardening effect upon water are the carbonates of lime and magnesia, causing temporary hardness, and sulphates of lime and magnesia, causing permanent hardness. I shall only refer to the former salts causing temporary hardness, as that is all that can be removed by the softening process. The softening here is effected in the usual manner by adding lime-water to the hard water, and for those to whom the process is not familiar, the following observations will, I hope, make it so. Sixteen ounces of chalk consist of about 9 ozs. of lime and 7 ozs. of carbonic acid, and by burning the chalk the carbonic acid is driven off, leaving the 9 ozs. of lime, which may be dissolved in not less than 40 gals. of soft water. This solution is called lime-water. An average sample of chalk-water is presented by 16 ozs. of chalk held in solution by 7 ozs. of carbonic acid dissolved in 400 gals. of water. Now, when the solution of 40 gals. of lime-water containing the 9 ozs. of lime is mixed with the 400 gals. of chalk-water containing 16 ozs. of chalk and 7 ozs. of carbonic acid, the 9 ozs. of lime will combine with the 7 ozs. of carbonic acid, forming 16 ozs. of carbonate of lime or chalk, which being insoluble precipitates, and the carbonic acid being thus absorbed, the 16 ozs. of chalk, previously held in solution, is likewise precipitated: the resultant therefore is 2 lbs. of precipitated chalk in 440 gals. of softened water. The process thus consists of a very simple chemical reaction, and one that is easily adapted for dealing with large volumes of water. The plant at this works comprises a small tank with stirrer, where the slaked lime is reduced with water to about the consistency of cream, two lime-water tanks for dissolving the cream of lime to form lime-water, and a range of settling-tanks, where the reaction and deposit takes place. The cream of lime from the mixer is run into the bottom of one of the lime-water tanks, which is then filled with soft water, thoroughly agitated, and allowed to settle. The lime-water thus made is then decanted into one of the settling-tanks, when about ten times its volume of hard water is pumped in, and the mixture is then left until complete settlement has taken place, when the clear softened water is pumped away to supply. We find that with three settling-tanks the pumping, both of the hard water into the tanks, and the soft water therefrom, may be carried on continuously. Each tank-full of soft water is tested with nitrate of silver, to ascertain that the whole of the lime has been neutralised, and the degree to which the softening has been carried is estimated clearly. It may be stated roughly the relative cost of softening water by lime, carbonate of soda, and soap respectively is:—

Lime	1/-
Soda	20/-
Soap	£20

Apart, however, from the commercial aspect of the case, and, speaking generally, it must be conceded by sanitarians that water treated in this way is distinctly improved in quality, and is, therefore, safer for dietetic purposes." The works are in the charge of the Engineer-in-charge, Mr. John Blackburn, A.M.Inst.C.E.

An inspection of the pumping-station and water-softening works was then made, after which the members partook of lunch, which was served in the engine-room.

The President, Mr. A. M. Fowler, C.E., occupied the chair.

Mr. Santo Crimp briefly proposed the toast of the Association of Municipal and County Engineers, and the President and Mr. Lewis Angell replied.

The President having thanked Messrs. Taylor, Sons, & Santo Crimp for their reception of and hospitality to the members of the Association that day, and Mr. M. Taylor having replied on behalf of the firm, the members proceeded to Hampstead to inspect the electric-lighting station and works there, and to hear a short paper upon the installation by Mr. W. H. Preece, C.B., F.R.S.

Mr. Preece said that the contract for the supply of the light was placed in the hands of Messrs. Siemens, the buildings being designed by Mr. Ardron, and the work carried out by local firms. A very scattered population had had to be dealt with, although the principal part of that population was centred in the neighbourhood of Old Hampstead, and it was only possible to meet the requirements of every part of the parish by the introduction of the high-pressure alternating system. At the present time there was not an inch of the parish that could not be supplied from the building in which they were assembled. Those buildings consist of an engine-room, which has two spans, and a boiler-room, and they afforded space for 50 per cent. more plant than they had already laid down, which would supply thirty thousand lamps fixed, and with the addition of another steam dynamo they would be able to supply another forty thousand lamps fixed. Tho boiler-house contained four Lancashire boilers, each competent to evaporate 5,000 lbs. of water per hour. The distribution throughout the district is on the high-pressure system. The mains are carried to seven sub-stations to different parts of the parish, and from these stations the distribution to the houses is entirely by low-pressure. In Mr. Preece's opinion electric-lighting at Hampstead was going to be a very great success, for although they had been open no more than three weeks they already had a load of 7,869 lamps. They started with the idea of getting orders for 10,000 lamps in two years, and in his opinion they would have 20,000 n less than twelve months. They were charging 6d per unit for the light, but they had a sliding scale, and the price might be reduced to 4d. per unit, while for power purposes is would be less still.

The President having thanked Mr. Preece for his paper, and Mr. Lewis Angell having said a few words, Mr. Preece replied, and the members dispersed.

THE SANITARY INSPECTORS' ASSOCIATION.

THE first meeting for the Session of 1894-5 of this Association was held on the 3rd inst. at Carpenters' Hall, London-wall, when the Chairman, Mr. H. Thomas (Bermondsey) delivered his annual address. There was a good attendance of members, including, with most of the principal executive officers, Mr. S. C. Legg (Hackney), who is resigning, after many years of honorary service, the office of Secretary. Mr. Thomas, after glancing backwards twenty years at the progress of sanitation in the Metropolis, in which he found many reasons for congratulation, referred to the present condition of matters sanitary and to points upon which further progress was necessary and to be desired. The indifference formerly almost universal with regard to the purity of drinking water, to the position of drains, water-closets, and various sources of pollution, and of the construction and position of cisterns had largely disappeared. The banks of the Thames were no longer those mounds of excreta, emitting in hot weather the most offensive effluvia, that they had been within the memory of most of the members. The Thames was no longer a stream of death and the source of infection, or of fatal epidemics to the dwellers on its shores. Open cesspools, privies, and middens had disappeared, and the sewers were not now the elongated cesspools which the absence of ventilating shafts, intercepting traps, and inspection chambers formerly made them. Wherever the metropolitan main drainage system applied, drainage might be considered fairly good, but in local sewers there was ample room for improvement. It was not creditable to some of our Local Authorities to find unventilated sewers, untrapped gullies, and open gratings the rule in certain districts where the fear of increasing the rates made the authorities turn a deaf ear to the warnings and appeals of their sanitary inspectors, and led to the neglect of their reports. Why should open sewer-gratings continue to emit their nauseous emanations when with the myriads of high chimney-shafts and furnaces of the Metropolis all the sewer-gas might be so easily cremated? Slum dwellings, back-to-back houses, and the narrow, ill-ventilated courts so common thirty years ago were rapidly disappearing; well-constructed blocks of dwellings were taking their place, and systems of the regular and frequent collection of house refuse were extending, the by-laws of the London County Council, made to this end, being a great step towards securing the total abolition in the metropolis of the dust-bin, and all its filthy surroundings. The power of enforcing the notification of cases of infectious diseases had proved a blessing to London, since its adoption in the Public Health Act of 1891, but it had become an abuse in some places, and unnecessary alarm was caused in the public mind by the tendency to look upon every sore throat as a case of diphtheria, and every scratch on the skin as erysipelas. The removal of infectious cases should be done at the instance of the proper sanitary officers, instead of on the application of the patient's friends or medical attendants. All the sanitary offices of Boards in London were, or ought to be, in telephonic communication with the offices of the Asylums Board, and removals could always be the most judiciously as well as expeditiously carried out if effected through the sanitary offices. The legislature having transferred the duty of preventing the pollution of the atmosphere by smoke nuisance to the sanitary inspectors, it was for them to justify the public confidence by intelligent watchfulness over factories and bakehouses. They must report such nuisances again and again to their local authorities until they were stirred into action against these sources of pollution. But here again it was necessary to point out the danger of a growing abuse. The indiscriminate condemnation of all underground bakehouses merely because they were underground, must seem absurd to all practical men, and the trading community would probably be the gainer if some of the work devolving upon the medical officer of health with regard to them were transferred to the sanitary inspector. The Chairman alluded, in conclusion, to a practice growing too common, of the readiness of medical and sanitary officers, for the sake of court fees, to appear in courts to give evidence against each other. They could not refuse to attend a court on subpœna, but they could always refuse to make the required visit where it was likely to fetter the hands of a brother sanitary officer.

In the discussion which followed, several of the points suggested in the paper were discussed, and the last point led to the proposal of a resolution by Mr. Grigg condemning the practice. The terms of the resolution were considered too drastic by most of the speakers, and it was eventually withdrawn. A protest was raised during the discussion, in the interest of assistant sanitary inspectors, against the conduct of some chief sanitary inspectors, who, it was alleged, were often harsh, unjust, and arbitrary in their treatment of subordinates. No resolution was proposed, but Mr. H. Alexander (Chief Inspector of Shoreditch) proffered to give an address on the subject at a future meeting. A cordial vote of thanks was accorded. In the members' conference which took place subsequently, Mr. Young (Battersea) referred to the additional difficulties put in the way of sanitary officials by a recent decision of a Marylebone magistrate, by which combined drains would be regarded as sewers. The effect would be to transfer to local bodies, who could only with great difficulty be got to move where expense had to be incurred, the onus of keeping in proper repair many drains for which, hitherto, property-owners had been held responsible. It was decided to leave the question to the Council for consideration and report.

Illustrations.

COUNTY COUNCIL OFFICES, WAKEFIELD.

THE contract for the erection of these buildings was entered into last June, and the works have been pushed on by Messrs. Armitage & Hodgson, under the guidance of Mr. A. E. Marsh, the clerk of works. The site is an excellent one, being bounded by four streets, situated near the highest part of the city, and adjoining the Court-house and the Town-hall, erected some years ago from Mr. T. E. Collcutt's designs.

A considerable amount of demolition had to be done to clear the site, and the excavations, being to a great extent in rock, have also retarded the work a little. A capital foundation is secured, and already considerable portions of the main walls are above ground. The whole of the façades to the streets are faced with tooled Ashlar stone from Mr. Turner's Brockholes quarry; this is a hard stone of fine even texture and colour, and weathers well in this district.

The floors and ceilings are being constructed by Messrs. S. Ferguson & Son, of Carlisle, on their fire-resisting system.

The perspective view now published was hung in the Academy, and was set up from the contract drawings. Some modifications in detail will, no doubt, be made in preparing the full-size details, which are of elaborate character.

The competition drawings, published in the *Builder* of April 29, 1893, afford a comparison of the variations already made, while giving a good idea of the type of building, the main lines of the design having always been adhered to.

The drawing was executed in water-colour by our assistant, Mr. T. Duncan Rhind.

GIBSON & RUSSELL.

WICKHAM HALL.

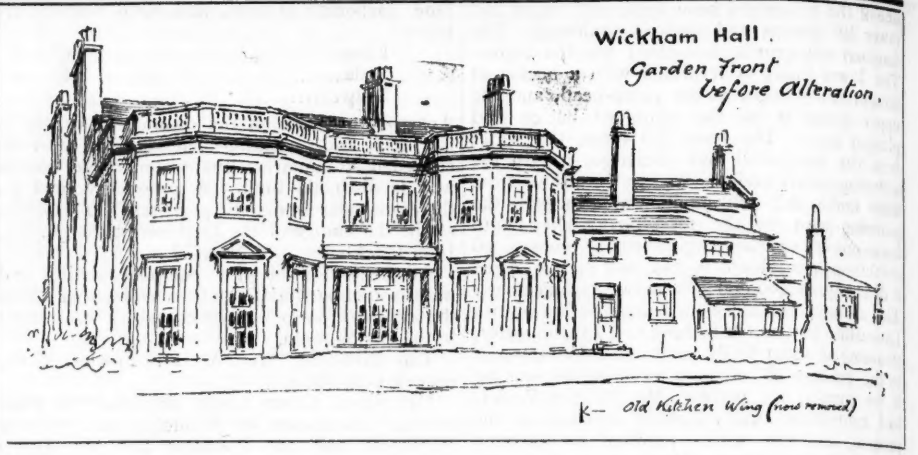
THIS house, the residence of Mr. G. Mellin, situated at West Wickham, near Beckenham, Kent, has for two years past been undergoing alteration and extension, rendering it of considerably more than double its former area, on plan, and proportionably increasing the accommodation.

The removal of the old kitchen block enabled the building to be extended westwards as far as conditions of the site would allow, the requisite accommodation being just secured by the projection forwards to the main road of a wing comprising servants' offices. From behind this another wing, containing billiard and smoking rooms, &c., extends backwards, bending at an angle with the main garden front. Between these two wings and the existing block of the old house, there is planned a large new dining-room, overlooking the lawn, and, on the entrance-front, a staircase-tower and a breakfast-room. From the old front entrance-hall, now enlarged, and made two floors high, a wide corridor is carried through the house terminating in a back hall, cut off by a glazed screen, and well lit by a glass slope.

Here is placed the tradesmen's inner-entrance, approached from its outer door by a covered colonnade open to the air. The dairy is entered from this, having an ice-house beneath it reached from the basement. Extensive and light cellarage is obtained under the whole of the new building, accessible by a gentle incline direct from the tradesmen's outer door, which opens on to the side road to the stables.

A feature of the house is the new kitchen, lined to its ceiling with glazed bricks in colours, and lit entirely from the roof by a glazed lantern. The comfort of the servants has been considered in planning their adjoining sitting-room with a sunny aspect and two bay-windows. A short serving route is arranged from the kitchen to the dining and breakfast rooms, each of which has its serving-door, shut off from the body of the house by swing-doors in the corridor. A hot-plate dresser in the back hall and a hatch for the return of plates through to the scullery, will facilitate the serving. The butler's pantry is immediately adjoining, fitted round with glazed cupboards, and having, opening from it, a fireproof plate safe.

On the house-side of the glazed screen partitioning off the back hall rises the children's staircase in proximity to the garden entrance. This latter consists of a circular vestibule separating the dining-room from the billiard-room, and forming, on plan, the pivot, as it were, on which the whole billiard-room wing turns, making a bend in the long façade towards the garden as



above-mentioned. From this vestibule, the billiard-room is approached through large sliding-doors of old oak opening on to a railed balcony which affords a view over the room from a height of three steps above the general floor level. The walls of this room are being lined with old panelling and embossed leather from Belgium, whence comes also the marble altar-piece now adapted as an overmantel. Centreing opposite to this is a wide-spreading bay-window, fitted with side seats, giving views over the terrace and lawn. At the upper end of the billiard-room an archway, with flanking openings, affords access to the smoking-room, an apartment ceiled by a low dome on pendentives, with semi-domes on either side, all executed in concrete and finished in plaster. In this room a semi-circular apse, with small windows of stained glass, closes the vista obtained right through the billiard-room from the centre of the garden-entrance vestibule. On the other side of this vestibule lies the dining-room (measuring about 22 ft. by 40 ft., with a large bay-window in addition), all panelled in oak up to the springing of its ceiling-cove. The breakfast-room, across the corridor, has its joinery of mahogany, including a high dado and mantel. The corridor itself is being lined with old oak panelling, and in the front hall an elaborate oak doorway of the sixteenth century, from Hildesheim, is being worked into the new wall-panelling, as the library entrance. Overhanging balconies in oak afford views down into the hall from above.

Guests' rooms occupy the first-floor of the billiard-room wing, and over these again, in the roof, the whole area is thrown into one large children's play-room, with its floor constructed independently of the ceilings under it. The sloped ceiling of this room springs from a deep wooden cornice crowning the upright panelling of which the walls are formed to a height of about 5 ft.

Over the dining-room and garden entrance is placed the family suite, containing its private bath-room, three other bath-rooms being provided in the house. On the same floor, just across the corridor, is the boudoir, in a sunny aspect, and having little seated bay-windows and a pair of casements opening on to a balcony above the wide breakfast-room bay-window. Close by is the school-room, and over the boudoir, on the second floor, is the boys' room, fitted up with complete double sets of drawers, wardrobes, cupboards, &c. Other bedrooms also have specially-designed fittings.

The main tower staircase, the children's staircase, and the one in the servants' wing are constructed with stout oak treads bedded solid on concrete in which iron supports are encased. All floors in the new work are laid over coke-breeze concrete and iron construction.

In the external treatment of the building an endeavour has been made to blend the new work with the old, and as far as possible to render the whole architecturally one design. This is much helped by extending the cream-coloured coat of lias lime rough-cast, used on the new work, over all remaining wall-surfaces and re-running the cement-dressings. The old garden front elevation, with its two bay-windows symmetrically arranged, is now extended by an additional bay of the same design—the centre thereby being shifted—and gables affording extra accommodation in the roof are thrown up over the wall-spaces between the bays. By reconstructing the roof over the old house to line with the new portion another floor of servants' rooms is obtained.

From above the garden-entrance, a low circular tower containing a cistern-room is carried up, marking the point where the change of direction in the garden front is taken by the billiard-room wing.

A domed conservatory is designed for the end of the old house, having a fountain placed centrally with the glazed doors opening from the drawing-room.

A conspicuous feature on the entrance front is the main tower, thrown forward at the junction of the new building with the old, covering the transition from one to the other. The cupola on this, sheathed with copper, will form an observatory containing an 8-in. refractor telescope, which, with the observatory, is being constructed by Sir Howard Grubb, of Dublin.

The installation for electric-lighting of the house is being carried out under the advice and superintendence of Messrs. Massey & Allpress, the wiring being executed by Messrs. Strode.

All soil drainage and plumbing has been entrusted to Messrs. Dent & Hellyer, who have also supplied and fixed the water-closet apparatus, baths, lavatories, and sinks.

A supply of soft water is secured by storing the rain-water in a large underground tank, with a filtering-chamber; thence it will be pumped up by electricity to a cistern, for distribution to the various draw-offs. Messrs. F. Edwards & Son are responsible for the hot-water supply from the kitchen boiler, and the hot-water heating by an independent boiler, as well as for the cooking-ranges and the grates, with their tiles throughout. Many of these latter are arranged as ventilating grates, discharging fresh warmed air into the rooms—extract flues also being provided.

The smoke-flues of the best rooms on the ground-floor are continued downwards to admit of their being swept from the basement.

Locks and door furniture are supplied by Mr. Jas. Gibbons. The stained glass is by Mr. C. E. Tute, and the plain lead-glazing by Mr. J. Jennings. Messrs. Waygood have put up the lifts, and Mr. F. Izant the electric bells and alarms. Marble work has been done by Mr. Lovelock. Messrs. Thurston are building the billiard-table to a special design.

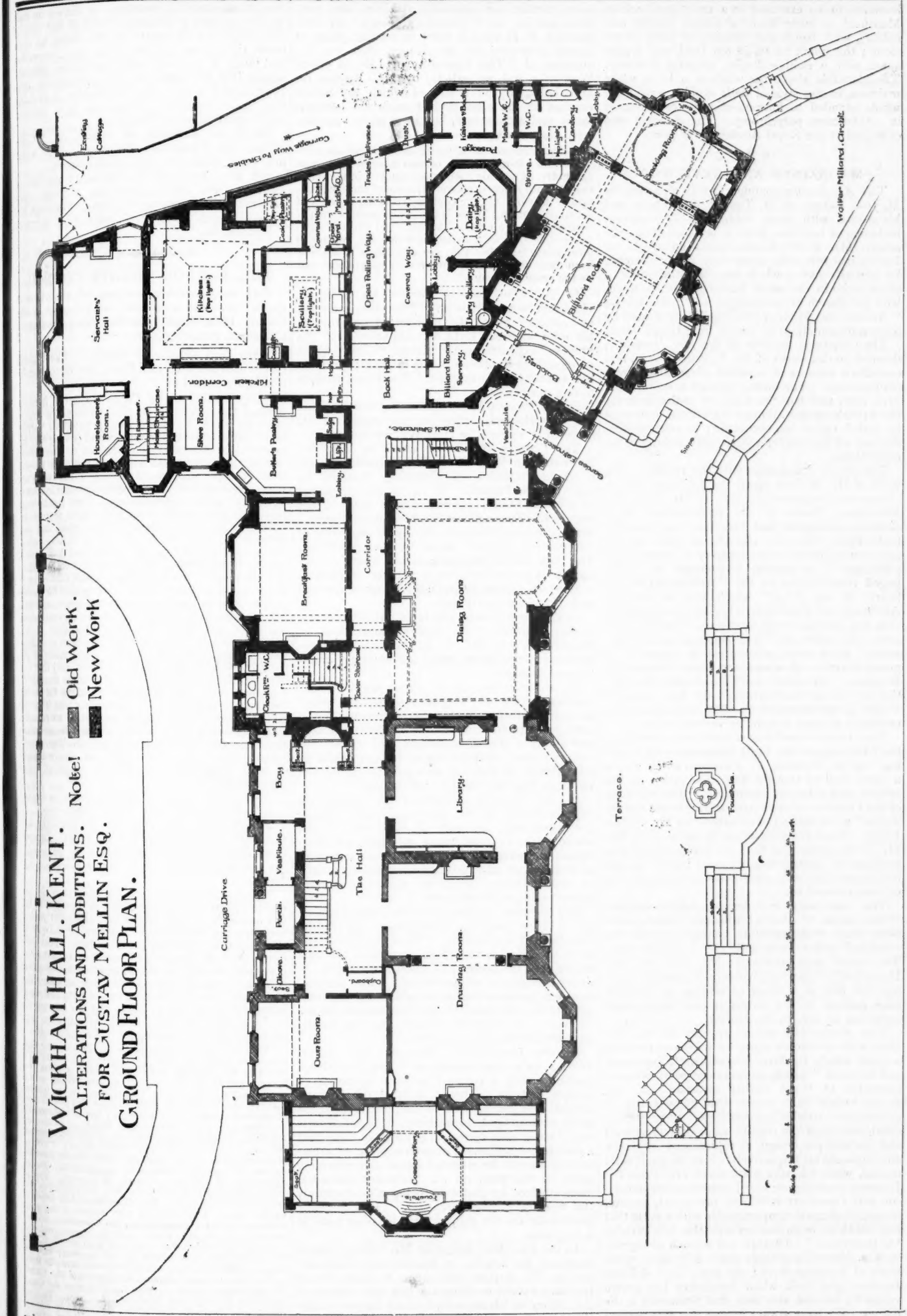
With the exception of a staircase from Mr. Heymann, of Hamburg, all the oak-work and plaster-ceilings in the hall are being carried out by Mr. J. E. Knox, who is also executing other carved work. Messrs. Geo. Candler & Sons, of Brixton, are the general contractors, the architect being Mr. Walter Millard.

RESTORATION OF THE CHANCEL, CANEWDON CHURCH, ESSEX.

THE present work consists in the restoration of the chancel only. Before beginning the work, every piece of stone that appeared to be sound was provisionally marked with a red cross; the result has been that most of the original tracery has been preserved, and all the most interesting pieces of masonry throughout.

The east end has been entirely rebuilt, as it was in a dangerous condition, and temporarily supported on the north side of the east window by a great brick buttress. A new arch has been built across the entrance to the chancel; this arch is 15 ft. 6 in. wide and 21 ft. high. The piscina and sedilia have been uncovered, restored, and brought forward to the new plaster face. The old door to the vestry has also been uncovered and brought forward. The upper part of the north and south walls have been rebuilt in cement, to receive the new roof.

The old roof has been entirely removed, as it was in a very rotten condition. The new roof is open to the ridge; the principals, purlins, cornice, &c., are in pitch-pine, unvarnished; the common rafters are in fir, stained light oak, sized



and varnished; the boarding is stained dark oak. The floor has been raised to the required levels, and is covered with small red tiles, with a double chocolate and black border. The choir seats are to be made of deal, stained green and varnished; the crosses on the bench-ends are bright red, and the angels in oak. The altar and reredos are in deal, stained three shades of red.

In taking down the masonry of the west window in the south wall distinct remains of a leper window were found. The lower portion of this window is now opened out to within 1 ft. 10 in. of the chancel floor, and restored as it was originally. Various pieces of an old painted stone monument were found in the east wall, buried in the heart of the wall. These remains have been put together, as far as possible, and built into the south wall.

Mr. Nathan Kemp, of Rochford, Essex, was the builder.

Messrs. Joseph Chater & Sons, London, did the whole of the glazing for windows.

W. HARGREAVES RAFFLES.

DESIGN FOR NEW WEST FRONT, ST. PHILIP'S, CLERKENWELL.

THIS design, which is not as yet carried out, is

intended to be executed in a red stone (such as Mansfield, or some stone of similar quality and colour), with bands and dressing of green-tinted stone; the porch to be in red brick and a grey stone, with a richly-coloured majolica doorway. The spandrels above the window to be in white majolica, in the style of della Robbia ware; the whole intended to form an effective combination in constructive polychromy. The drawing was exhibited at the Royal Academy this year.

MAGAZINES AND REVIEWS.*

THE *Art Journal* commences with an article by M. Jean Bernac on M. Tony Robert-Fleury and his works, with some interesting illustrations, including a facsimile from a pen-sketch by the artist. Mr. F. G. Kitton writes an article on Rickmansworth, with some very pretty sketches by himself, and a whole-page illustration of a street scene in the small Buckinghamshire town, with the church in the background. An article on "Ancient and Modern Dancing" is illustrated by some representations of dances from Greek vases.

The Christmas number of the *Art Journal* is devoted to the works of Sir E. Burne-Jones, and contains a number of beautiful illustrations from his paintings. The literary portion is supplied by Mrs. Ady, and has the merit of enthusiasm for the writer's subject, though its critical tone may be called rather too optimistic; in other words, she sees all the painter's merits and nothing of his restrictions.

The *Studio* commences with the review of the work of Mr. William Stott, "of Oldham" (as he chooses to designate himself), by Mr. R. A. M. Stevenson. Some of the reproductions from sketches go to show that Mr. Stott can draw the nude figure when he chooses, in spite of the apparent evidence to the contrary of many of his paintings. The account is prefaced by a full-paged reproduction of the "Awakening of the Spirit of the Rose," which was in the last Academy, and which certainly gives more promise than any previous work by the artist that we have seen. An article on "The Secessionists of Germany" gives some information in regard to a group of artists of whom not much is known in England. An article on "The Artistic Decoration of Cloth Book-covers," by Mr. Gleeson White, is accompanied by some original and exceedingly piquant designs by various artists.

The *Architectural Record* includes an article on the "Influence of the Early Renaissance on Painting," by Mr. Banister F. Fletcher, which shows a great deal of thought and observation on the subject, and is largely illustrated. "The Influence of the French School on Architecture in the United States" is the subject of an article by Mr. Ernest Flagg. Some remarks on the imitators of the late Mr. Richardson, who have out-heroded Herod in copying his mannerisms, we quite concur in, and it is hoped they will receive the attention of the culprits referred to.

The *Antiquary* includes an article entitled "More about St. Paul's Cathedral," which, however, deals with incidents connected with the cathedral rather than with the building itself. The same issue contains No. XV. of Mr. Haverfield's "Quarterly Notes on Roman Britain," and the first of a series of articles on English glass-making in the sixteenth and seventeenth centuries, by Mr. E. W. Hulme.

The *Fortnightly* (which appears for the first time with no editor's name on its cover) contains a short article by Mrs. Meynell on "Symmetry and Incident" which we commend to all who are interested in "the higher criticism" in art, as an article quite above the general run of art-criticism articles in magazines. It is a short consideration of the relative value of symmetrical and picturesque design, as represented by Greek and Japanese art respectively. Mrs. Meynell says, indeed, what we have maintained ever since the Japanese craze begun; that Japanese art in comparison with Greek art is "local, provincial, remote, incapable of equal companionship with a world that has Greek art in its own history—that has Pericles 'to its father.'" There is not a touch of bigotry in Mrs. Meynell's article; she is fully alive to the merit of Japanese work; she sees "how delicate Incident may look when Symmetry has grown vulgar"; but she also sees that Symmetry is the higher. We have always known that this perception must return again, but Mrs. Meynell's is the first utterance of it that we have noticed. The same number (an unusually excellent one) contains articles on "Venetian Missals," by Mr. Herbert P. Horne; a most interesting piece of logical reasoning by Sir Robert Ball on the question of "The Possibility of Life in Other Worlds"; and an article by Mr. Rücker on Helmholtz, in the course of which the writer touches on the often-made comparison between music and architecture, but in a more scientific spirit than usual:—

"The selection of a series of notes which were *à posteriori* found to obey certain natural laws, was voluntary. The scale itself is not natural, in the sense that it is not a necessary consequence of the construction of the ear. On the contrary, it is the product of artistic invention. Music is thus not a mere branch of mechanics, but an art. The architect and the composer alike deal with materials which are subject to mechanical laws, but they are alike free to fashion from these forms determined not by calculation, but by the sense of beauty."

In the *Contemporary Review* Mr. Frederic Harrison, in an article on "The Amalgamation of London," blows the trumpet of progress in his most vigorous style, in jubilation over the proposed extinction of the historic "City," which he regards as a solution of the municipal problem that cannot long be delayed. There are two sides to that question.

In the *Revue Générale* (Brussels) will be found the very eloquent article on the church of St. Stephen at Vienna, by Herr William Ritter.

The *Century* contains an article by Mrs. Van Rensselaer on "The Churches of Provence," with a whole collection of charming sketches by Mr. Joseph Pennell. It is, of course, rather of interest to the general reader than to the architect. The series on "Old Dutch Masters" is represented this month only by an engraving of the portrait of Paul Potter by Van der Helst. The new life of Napoleon, which starts in this number is accompanied by a number of illustrations of scenes, houses and rooms connected with Napoleon's early days.

In *Harper* the only article of artistic interest is one entitled, "An Artist's Impressions of Rajpootana," by Mr. E. L. Weeks, with illustrations by the artist, which include some architectural sketches.

In *Scribner* Mr. H. G. Prout continues his excellent article on "English Railroad Methods," an article which is highly complimentary to the management and *personnel* of English railroads, and shows a degree of insight and correct observation very unusual among foreign critics on this subject. It contains some good illustrations of viaducts, English roadside stations, &c.

In the *English Illustrated* an article on "Popular Art," by Mr. Mason Jackson, is chiefly concerned with the work of Sir John Gilbert, whose works (a good many of which are illustrated) are perhaps among the very best examples of that type of art which, while appealing mainly to popular tastes, preserves always a certain amount of dignity and power.

In *Longman's Magazine* Sir Benjamin Richardson tells us, in a paper originally read at the Grindelwald Conference, "How to Make the Most of Life," in regard to preserving the best healthiness of body and mind; a subject of interest to men of all professions. The parallel, however, between the engine which did not wear out and the men who did, and the reasons for the difference, is rather far-fetched, and can hardly be accepted as serious argument.

In the *Gentleman's Magazine* Mr. Lacon Watson, in a short article on "The Specialist," concludes with a contrast between specialism in science and art. That a number of scientists should have contributed to the present condition of the electric light, he observes, does not distress us; "but it does appeal to our artistic taste, that a painting or sculpture, or even a piece of architecture, should be executed under the informing spirit of one man. . . . . Salisbury Cathedral owes much of its charm to being almost entirely the work of a single architect." This is better good sense on the subject than we often read in a magazine.

In the *Pall Mall Magazine* Mr. Walter Besant continues his articles on Westminster, illustrated by Mr. W. Patten, who seems to have chosen (perhaps wisely) to illustrate bits and corners of the Abbey which are not popularly known, rather than its more familiar aspects. Mr. Clinch's article on "Christ's Hospital" is accompanied by some very interesting reproductions of old engravings showing portions of the school as it existed in former days.

In the *New Review* Mr. Dolman gives the second of his articles on "Municipalities at Work," dealing in this article with Manchester. He speaks quite rightly in praise of the energy of the Manchester Corporation, as shown in their operations both at Thirlmere and in the case of the Canal, and in regard to the latter he is no doubt right in saying that unless the Corporation had taken it up and made themselves partially responsible the Canal would probably not have been carried out at all; but whether in so doing they have benefited Manchester is a question which must be left to the future.

Blackwood contains an article on "Club-Homes for Unmarried Working-men," which may be of interest to our artisan readers.

We have received the fourteenth number of *Pictures from Punch*, including a great many very excellent specimens of Keene's drawings and some of Leech's historically interesting satires on "Bloomerism."

* The object of these notes is to point out anything in the contents of the current magazines which is of special interest to our readers, with occasional brief criticisms on the views expressed in such articles. When a magazine which has been sent to us is not noticed, it is because that number contains nothing that it is within our province to comment upon.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday at the County Hall, Spring Gardens, Sir John Hutton, Chairman, presiding.

Australian Woods for Paving.—The Finance Committee reported as follows, the recommendation being agreed to—

"On October 16 the Council referred it to the Finance Committee to consider whether the term of years for which loans are now granted to Vestries and District Boards for hard-wood paving may not properly be extended, on account of the greater durability of that wood as compared with the soft wood hitherto in use. It is only a few years ago that the woods now known in the London market as jarrah and karri were introduced from Australia as very desirable woods, from their hard texture, for paving purposes in place of the pine and deal hitherto in use, which are of a softer nature. There is no doubt that the jarrah and karri woods are much the hardest, and presumably will therefore last the longest, but we are not aware that either of these woods has been tested in England for paving purposes for so long a period as ten years, although it is thought from inspection of jarrah wood which has been laid down for some time that it will probably last ten years. We are therefore of opinion that no sufficient test has yet been made of the period for which these woods will last, and that it is undesirable at present to fix any definite number of years over which the repayment of loans for paving with such woods should be spread, but that it should be left to the Committee as heretofore to consider each application upon its own merits, it being understood that the Committee will give the Vestries and District Boards the full benefit of any extension of term which the circumstances admit of. We recommend—

'That for the present no definite period be fixed for repayment of loans for jarrah or karri wood-paving.'"

The New Building Act and the Building Act Committee.—The report of the General Purposes Committee contained the following paragraph, the recommendation being agreed to without discussion—

"The consolidation and amendment of the law relating to streets and buildings in London by the Act passed in the last session of Parliament renders necessary an alteration in the form of the order of reference to the Building Act Committee. That Committee has submitted to us a new form of order prepared after careful consideration, which in our opinion is in all respects suitable for the purpose. The alteration is, as will be seen, one of form and not of substance, the consolidation of the law into one Act of Parliament enabling the order of reference to be made somewhat more concise. We recommend—

'That the order of reference to the Building Act Committee be as follows—The Committee shall consist of not less than ten and not more than twelve members. The London Building Act and all matters arising out of it shall stand referred to the Committee. In the following matters the Committee shall exercise the powers of the Council—Construction of buildings; Special and temporary buildings and wooden structures; Rights of building and adjoining owners; Dangerous and neglected structures; Sky-signs; Storing of wood and timber; Preventing obstructions in streets (Section 199); District Surveyors, except as regards permanent appointment, dismissal, alterations of districts, or mode of payment. Upon all other matters arising under the Act, the Committee shall report to the Council. The Committee shall enforce all by-laws made by the Council with respect to the various matters referred or delegated to the Committee, and shall prepare and submit to the Council for approval such other by-laws with respect thereto as may seem expedient. The Committee shall have power to take necessary legal proceedings under the Act, but shall not prosecute an appeal to the High Court without the sanction of the Council. The Committee shall exercise the powers of the Council under the Factory and Workshop Act, 1891. The Committee may direct the seal of the Council to be affixed to such licences, consents, sanctions, approvals, or notices as may be granted or given by the Committee on behalf of the Council. The Committee may meet as often as may be necessary when the Council is in recess, and at any meeting so held, as well as at any meeting held so nearly before the recess that it is impracticable to take up a report before the Council adjourns for the recess, the Committee shall have power to grant or refuse any application made to the Council under the Building Act, and generally to act on behalf of the Council in relation to the matters included in the Committee's order of reference; provided that this

Committee shall act only upon such decisions as are unanimously arrived at by the members present. All such decisions shall be reported to the Council at its first meeting after the recess.'"

The Compulsory Purchase of Tramways.—In accordance with special notice required by the statute, Mr. Edwin Jones (Chairman of the Highways Committee) moved:—"(*a*) That a notice in writing, under the seal of the Council, be served upon the London Tramways Company, requiring the company to sell to the London County Council, under the conditions and in the manner provided by Section 43 of the Tramways Act, 1870, the whole of the tramways, works, and undertaking authorised by the Metropolitan Street Tramways (Extension, &c.) Order, 1873, and the Pimlico, Peckham, and Greenwich Street Tramways (Extension) Order, 1873, as confirmed by the Metropolitan Tramways Orders Confirmation Act, 1873. (*b*) That the clerk be instructed to apply to the Board of Trade for its approval to the terms of the foregoing resolution, and to serve the notice therein referred to so soon as the Board of Trade shall have signified its approval. (*c*) That it be referred to the Finance Committee to take the necessary steps to obtain the insertion in the Council's Money Bill of the year 1895 of a clause empowering the Council to raise the money required for the purpose of purchasing the said tramways, works, and undertaking." He said it was a proposal to purchase two miles of trams extending from Kennington Park-road to Great Dover-street in the Old Kent-road. Although that was only a small portion of the line, it was a very important section, inasmuch as two important sections branched from it. The other portion of the line, about seventeen miles, would fall in in about four years. He did not anticipate any opposition on the part of any member of the Council.

Mr. Benn, M.P., seconded the motion.

On a division the voting was—For the motion, 103; against, 4.

Tower Bridge (*Southern Approach*) *Bill.*—A joint report of the Parliamentary and Improvements Committees reported that they had proceeded on the resolution of the Council of October 9, referring it to them to consider and report to the Council what further steps it was advisable that the Council should take in connexion with the Tower Bridge (Southern Approach) Bill, the inquiry to include also the question of route. There could be no doubt as to the desirableness of forming the approach, and, having considered the alternative routes which had been suggested, as well as the line of approach which has been submitted to Parliament, they were strongly of opinion that the latter line should be adhered to. The question of the form in which the Bill should be again presented to Parliament had also engaged their attention, and after careful consideration they had come to the conclusion that the best course would be to introduce the Bill in the form in which it left the House of Commons. They recommended—"(1) That the line of route previously decided upon by the Council for the southern approach to the Tower Bridge be adhered to. (2) That the Bill be reintroduced in the next Session in the form in which it was passed by the House of Commons and sent up to the House of Lords in June, 1894."

The recommendations of the Committee were adopted after discussion on two amendments.

The Council adjourned after transacting other business.

ENGINEERING SOCIETIES.

THE INSTITUTION OF JUNIOR ENGINEERS (formerly "The Junior Engineering Society").—Mr. Alexander Siemens, M.Inst.C.E., of Woolwich, has accepted the presidency of this Institution for session 1894-5, in succession to Mr. J. Wolfe Barry, C.B., V.-P.Inst. C.E.; and will deliver his Presidential Address on Friday evening, 16th inst., at the Westminster Palace Hotel.

THE INSTITUTION OF CIVIL ENGINEERS.—The Institution of Civil Engineers is building new premises, but these will not be ready until a year hence. In the meantime arrangements have been made by which the old meeting-room can be reached from a temporary entrance in Great George-street. The members will assemble next Tuesday, the 13th inst., to hear the inaugural address of the new President, Sir Robert Rawlinson, K.C.B., and to witness the ceremony of presenting the prizes and premiums awarded for papers read last session.

SLATE TRADE.—The briskness in this trade still continues. Prices are being discussed and will shortly be fixed for the coming year. A moderate advance is anticipated, but one that will not disorganise trade or invite competition.

ARCHITECTURAL SOCIETIES.

BIRMINGHAM ARCHITECTURAL ASSOCIATION.—We have received the Report of the Birmingham Architectural Association, from which we learn that a class of design has been started in connexion with the Association, under the direction of Mr. Bidlake; and also that some new and satisfactory arrangements have been made in regard to the permanent use of a room, for centralising the work of the Association. The Report is accompanied by some sketches by Mr. Bewlay of some of the places visited during an excursion to Broadway.

GLASGOW ARCHITECTURAL ASSOCIATION.—The usual monthly meeting of this Association was held on Tuesday evening, in the Rooms, 114, West Campbell-street—the President, Mr. A. N. Paterson, in the chair—when Mr. J. Kennedy Hunter (Messrs. Morris & Hunter, Ayr) delivered a lecture entitled "On Tramp," being the description of tours in Northamptonshire, from Kettering as a centre, undertaken in September of this year. Photographs from Mr. Hunter's camera of many interesting parish churches, and some domestic work, were exhibited by means of limelight, the lecturer adding a running commentary. Among others, views were shown of the Eleanor Cross at Weekly; St. Sepulchre's, at Northampton, one of the few circular churches in England; the famous Saxon tower of Earls Barton, and several different views of Peterborough Cathedral. In concluding, Mr. Hunter recommended Northamptonshire as a field for sketching well worth a visit, and remarked that in every hamlet work is found which will repay close and intelligent study. He advised those going sketching to have a definite scheme of work mapped out before leaving.

Correspondence.

To the Editor of THE BUILDER.

THE COUNTY COUNCIL AND THE NEW RIVER COMPANY.

SIR,—In your issue of October 27 is a report of the Parks Committee of the County Council respecting a notice from the New River Company requiring alterations to be made in the flushing apparatus at Waterlow Park. Apparently the County Council is unaware of its rights. The water supply in question is not a supply for domestic purposes, and as a consequence the County Council has a right to be supplied by meter, and when so supplied the New River Company will have no right whatever to interfere with the fittings. The charge for water will probably be very much less than by rate; we usually find it about one-fourth.

Apparently it is not generally known in London that the companies are compelled to supply water by meter for other than domestic purposes at a rate provided by their Acts of Parliament. In the Act of one of the companies, however, the price is omitted, and this company charges what it pleases, but we think a refusal to pay if followed by an application by the company to a Court of Law would result in the Court giving judgment for a merely reasonable rate. At any rate, the New River Company is not in this position, and it is perfectly clear the County Council can demand a supply of water by meter, and there is a simple and inexpensive method of enforcing its demand. T. A. EADON,

Secretary, Water Carriage Engineering Co.

BATH ABBEY CHURCH.

SIR,—In the paper on this building in the *Builder* of November 3, the writer has adopted the, to me, untenable theory that the present church is but the nave of the earlier one of Bishop de Villula, and that the original transepts, choir, &c., lay further to the east, and have been completely destroyed.

Some years ago I made a careful study of the existing building, and by the comparison of it with others of the Benedictine Order, I arrived at the following conclusions, which I incorporated in a paper on "Church Doorways," read before the Bath Field Club, December 12, 1888.

I. On the south side of the church there are three doorways (one in the second bay from the west, and the others in the two bays east of the transept).

II. The first-mentioned, from its position, must have faced the west walk of the cloister, and abutted on the abbot's house, and so would be the "abbot's door."

III. The present vestry door is the corresponding one facing the east walk (the "monks' door").

IV. I have seen a plan (dated 1725) that gives the square of the cloister, about 110 ft. each way, and shows the following peculiarities—viz., the north walk was not close to the wall of the church, but beyond the present transept, and was connected with the abbot's and monks' doorways by short passages, the present vestry being one, and the east walk about 3 ft. lower than the others, following he then fall of the ground eastwards.

V. The Norman arches in the east walls of the aisles are not in the middle, showing thereby that the turrets on either side are contemporary.

VI. These turrets, from the analogy of other Norman Benedictine churches (*e.g.*, Gloucester, Durham, Peterborough), must have flanked *the chord of the apse*, the high altar standing exactly where the apology for one does at present.

VII. The door just east of the present vestry must have opened into the sacristy, a perfectly convenient site with relation to the high altar in this position, but highly incongruous if this was only the nave of the church.

VIII. The present transepts, I believe, replace two flanking towers—the building being of similar ground-plan to Exeter Cathedral—and mark the boundary between nave and choir. They are very similar to the choir transepts at York, which replaced flanking towers of an earlier structure.

IX. The central tower, like the transepts, is of such late work (James I.) that all idea of a monastic church had long passed away. As the apse and Lady Chapel had been destroyed, it was built to complete a mutilated design as far as possible.

X. There is a rise of about 18 in. in the plinth east of the sacristy doorway. This could not be, owing to the rise of the ground—for we know it fell towards the east—but must be from the internal rise to the high altar. Prior Birde's chantry occupies the post of honour beside the high altar, as might be expected, he being practically the refounder of the church.

There are many other points—trifling in themselves and almost impossible to describe on paper—that confirm my theory, and I have never met with any that upset it. REGINALD A. CAYLEY.

Bath, November 5, 1894.

SIR,—In your interesting though short account of Bath Abbey Church in this week's number of your paper, you state that the flying buttresses to the nave were added under Sir Gilbert Scott's restoration of the church. This is not the case, as these buttresses were erected about the years from 1823 to 1834—when the Corporation of Bath, as then patrons of the living, carried out a great restoration of the church and its surroundings, at a large cost; removing also many houses built close against the edifice, which had been a disfigurement for centuries, and thus improving the approaches to, and the appearance of, the church. In 1832 the patronage was transferred from the Corporation to the Simeon's Trustees, by whom it is now held.

J. DAVIES.

ACTION OF WATER ON GALVANISED IRON.

SIR,—Has "G. H." any iron connexions attached to his galvanised tank? If so, this would probably account for the apparent destructive action of the water; or, perhaps, the tanks were not properly coated with zinc in the first place, and consequently some unprotected "spots" of iron were left exposed to the action of the water and zinc. When zinc and iron are placed in contact in water containing mineral salts (especially chlorides of sodium and magnesium) a galvanic action is produced, and this is, perhaps, the cause of "G. H.'s" trouble. Some months ago I placed an iron plate in a galvanised iron pail containing sea-water, and in the course of a few days the zinc had disappeared from that part of the pail which was in contact with the water. If the destructive action is, however, due merely to some constituent of the water, it would, as you say be impossible to answer "G. H.'s" questions without making a chemical examination of the water.

H. H.

"WARNER & CO. *v.* GAY AND OTHERS."

SIR,—Permit me to correct an error in your report of the case of myself and another *versus* The Dulwich Constitutional Club, which appears in last week's *Builder*. The judgment was entered for the plaintiffs, with costs on the *High Court* scale, and not as you put it. WALTER DAVIES

(BOULNOIS & WARNER).

The Student's Column.

DETAILS OF RURAL WATER SUPPLY.—XIX.

FIRE SERVICE, VALVES, AND METERS.

THE details necessary for the provision of an efficient fire service too often receive but scanty attention in waterworks construction, especially in rural districts. The advantages of having a powerful stream of water, easily put into requisition and capable of playing upon any portion of a building in a state of conflagration, are too great to need impressing upon the student. It is necessary, however, to point

out that these facilities can frequently be attained at very little extra cost if the necessary arrangements are included in the original design of the waterworks, whilst the cost of their subsequent provision may be prohibitive. The principal points to be kept in view in making provision for fire-service are :—

1. That there shall be a surplus storage of water for fire extinction over and above that required for general purposes, and always available.

2. Such storage to be at a sufficient elevation to allow of the water being forced above the tops of the highest buildings in the district.

3. The mains and distributing-pipes to be of such dimensions as to allow of the water for fire extinction purposes being conveyed through them when the demand for water for other purposes is at its greatest.

These requirements cannot always be secured in their entirety, but they indicate the lines which must be kept in view. The surplus storage is usually included in the capacity of the service-reservoir, and the amount to be allowed for must depend upon the special requirements of the district under consideration, as well as upon the means at the disposal of the engineer.

Assume, for the sake of example, that on the grounds of probability and expediency, only one fire at the same time in the district is to be provided for, that the probable time occupied in extinguishing the fire will be three hours, and that one jet, 50 ft. high, will be required. Theoretically the height of the water issuing vertically from a jet should be equal to the head upon the jet, but the resistance of the air causes a considerable reduction. Experiments show that the difference between the theoretical height and the actual height attained by a jet of water varies approximately, directly as the square of the theoretical height and inversely as the diameter of the jet.

Mr. Box ("Practical Hydraulics") gives the following formula—

$$h^1 = \frac{H^2}{d} \times \cdot 0125,$$

Where H = the head on the jet in feet,

h^1 = the difference between the height of the head and the height of the jet,

d = diameter of the jet in $\frac{1}{8}$ of an inch.

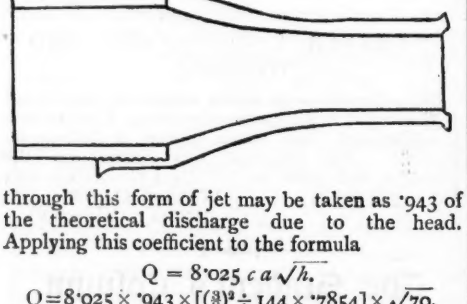
It is evident from the above relations that in order to obtain the best results from an available head, a jet of special diameter corresponding to that particular head must be used. Assuming an available head of 70 ft. at the point under consideration, then

$$h^1 = 70 - 50.$$

$$d = \frac{H^2 \times \cdot 0125}{20} = 3$$

or the proper diameter of jet to be used, under the circumstances, is $\frac{3}{8}$ of an inch. The quantity of water discharged by a jet with a given head depends upon the form of the jet (see Chap. x., Gauging by means of an Orifice), the best form being that which approaches most nearly to the "vena contracta" (fig. 51). The discharge

Fig. 51.



through this form of jet may be taken as ·943 of the theoretical discharge due to the head. Applying this coefficient to the formula

$$Q = 8 \cdot 025\, c\, a \sqrt{h}.$$

$$Q = 8 \cdot 025 \times \cdot 943 \times [(\tfrac{3}{8})^2 \div 144 \times \cdot 7854] \times \sqrt{70}.$$

$$= \cdot 04856 \text{ cubic feet per sec.}$$

$$= 18 \cdot 21 \text{ gals. per min.}$$

If the jet is required to play for three hours, then the quantity of water discharged will be $18 \cdot 21 \times 60 \times 3 = 3277 \cdot 8$ gallons. It would, therefore, be necessary to provide surplus storage capacity in the service reservoir for, say, 4,000 gallons; and the diameter of the mains and distributing pipes must be chosen so as to allow of an extra quantity, equal to 18·21 gallons per minute, being conveyed through them when the demand for water for other purposes is at its greatest.

In order to render a fire-service efficient, it is necessary that a sufficient number of hydrants should be provided upon the system, the situations being selected with great care, so that each may yield the maximum of efficiency. They should be easily accessible, capable of rapid manipulation, not difficult to find in the dark, and so constructed as not to be affected by frost.

In designing a waterworks system, the available head at any point is arrived at by deducting the loss of head due to friction in the pipes from the statical head at that point (Chap. xi.). It must be remembered that these results will only hold good provided that the system is water-tight, allowing practically no waste. Sir Frederick Bramwell, speaking of the evils of waste, at a recent meeting of the Institution of Civil Engineers, expounded this point very clearly:—"Another point was the diminution of the pressure in the pipes. It was impossible to obtain an extra amount of water through a given-sized main, except by having a greater differential pressure between the entering end and the delivery end of the main. The entering end of the main was fixed by a reservoir or a stand-pipe level, or whatever it might be, and the consequence was that the increase in the differential pressure must be obtained by diminishing the pressure at the delivery end. What was the result? Any hope of using the water for hydrant purposes, for extinguishing fires, was gone; there was no pressure for that."

The two principal types of hydrants or fire-cocks are the sluice-valve and the ball-hydrant. There are innumerable forms in the market, but they are all modifications or combinations of these two types. The sluice-valve hydrant consists, as its name implies, of a sluice-valve connected with the main, with a bend attached to its outlet fitted at its upper end to receive a stand-pipe to which the hose is fixed. The stand-pipe is either fitted to the hydrant by a screw, or bayonet-joint. The stand-pipe is sometimes a fixed pillar, which has the advantage of easier access at times of fire. The sluice-valve is the best form of hydrant, but entails a heavier first expense than the ball-hydrant. A frost-cock, which may be automatic, must be attached on the outlet side of the sluice-valves, for the purpose of removing the water which would otherwise remain in the bend (or pillar) after use.

The ball-hydrant, patented by Messrs. Bateman & Moore, consists of a vulcanite ball contained in a valve-box; the outlet to the box, which is vertically above the ball, and is fitted with a leather or india-rubber washer, being kept constantly closed while the water in the main is under pressure, by the ball, which is lighter than the water, being forced up against it. The stand-pipe is attached to the hydrant by means of a bayonet-joint; and the valve is opened by depressing the ball by means of a spindle passing down through the stand-pipe and worked by a crutch-handle. Ball-hydrants are economical, and work exceedingly well with moderate heads. With low heads they are apt to leak, and with high heads the ball is liable to be forced out of shape, causing leakage when it takes a new bearing upon its seat. Another objection is caused by the suction into the main through the ball-hydrant, when the former is being emptied of any liquid matter, frequently of a filthy nature, which may be at the time in the hydrant-chamber. Ball-hydrants also act as air-valves, but with very doubtful advantage, on account of the large orifices, which allow the air to escape so rapidly, while the main is being charged, as to endanger the pipes by shocks.

Air-valves are used for the purpose of getting rid of the air which constantly accumulates at the highest points of undulations in the line of pipe, especially where such points are situated above the hydraulic mean gradient (see Chap. xi.). They are either automatic, in which case they are identical with the ball-hydraunt except that the aperture which serves for the escape of the air is much smaller ($\frac{1}{8}$ to $\frac{3}{8}$ in. in diameter); or they consist of small stop-cocks, opened and closed by hand.

Sluice-valves vary little in form, and usually consist of a cast-iron body containing a movable diaphragm which slides vertically between grooves. The sliding faces both of the body and of the movable valve should be made of gun-metal, as well as the screw which actuates the valve and the stuffing-box gland through which the screw works. It is best to obtain them with spigot and socket ends attached by means of bolts and nuts, so that they can be removed if necessary without cutting the pipes. Sluice-valves should be fixed at all branches in a waterworks system; and the mains and branches should be divided up into easily-worked sections by means of sluice-valves, so that each section may be isolated from the rest with a minimum of inconvenience to the consumers generally. Sluice-valves should be plentiful on all waterworks systems, and it is false economy to attempt to make a saving by reducing their number.

Water-meters are inserted in a line of pipe for the purpose of measuring and registering the flow of water passing through them. There are two types—the positive and the inferential. The positive meter measures the flow of water by causing it to alternately fill and empty a vessel of known capacity, the number of times that this process takes place being recorded by means of a clock-work mechanism. The positive meter is subdivided into high and low-pressure meters—the Duncan, Kennedy, Frost, Schönheyder, Frager, and Kent meters representing the former; the Parkinson and Tylor representing the latter class. The inferential meter consists of a chamber through which the water flows, containing a wheel with vanes or discs attached. The water in passing impinges against the vanes and causes the wheel to revolve, the revolutions being recorded as in the positive meter. The Siemens, Tylor, and Sporton meters are instances of this type. The mechanism of the positive meter is similar to that of the cylinder and slide-valve of a high-pressure steam-engine, while that of the inferential meter may be compared to a water-wheel or turbine. Messrs. Turner & Brightmore ("The Principles of Waterworks Engineering") give the following essentials as characteristic of a perfect water-meter :—

1. Accurate registration of the quantity of water passing through it, whether great or small.

2. Ability to perform its work without causing a material loss of head in the supply-pipe.

3. Cheapness and simplicity.

4 Ease of attachment and repairs.

5. Freedom from excessive wear of the working parts.

Section 58 of the Public Health Act, 1875, empowers a Local Authority "to agree with any person to supply water by measure, and as to the payment to be made in the form of rent or otherwise for every meter provided by them." The question as to whether the supply of water for domestic use should be charged for by measure has been largely discussed. There is a strong feeling against this method on sanitary grounds, as far as it applies to houses of low rental; the objection raised against it being that water would be economised at the expense of cleanliness and health, in the very situations where these are of the greatest importance to the general community. Where the water is supplied for trade or manufacturing purposes the case is different, and, where it can be arranged, the sale should be by meter. This question is of the most importance where the water has to be pumped.

Meters have not been largely introduced into rural districts, although they can be applied with great benefit to farm—especially dairy-farm—supplies. In a dairy-farm where the milk is refrigerated, the consumption of water for that purpose alone is frequently 1,000 gals. a day.

As the size of the pipe for conveying a supply of water to any premises frequently depends upon other considerations than its capacity for delivering that supply, it must not be taken as the gauge of the meter to be inserted on its line. The following table, which refers to Siemens' Inferential Meter, will be found useful in deciding upon the size of meter applicable in any particular case :—

No.	Inch.	Delivery in Gals. per Hour.	
		50 ft. Head.	150 ft. Head.
1	$\frac{3}{8}$	150	250
2	$\frac{1}{2}$	300	500
3	$\frac{3}{4}$	600	1,000
4	1	1,500	2,500
5	$1\frac{1}{4}$	2,200	3,800
6	$1\frac{1}{2}$	3,000	5,000
7	2	4,000	7,000
$7\frac{1}{2}$	$2\frac{1}{2}$	6,000	10,000
8	3	8,300	14,000
9	4	13,400	23,000
10	5	18,500	32,000
11	6	27,000	46,000
12	8	45,000	77,000
13	10	70,000	120,000
14	12	90,000	154,000

It is always better to allow a safe margin in deciding upon the size of a meter. Where the

water is expensive, either on account of pumping or where it is purchased by measure by the undertakers in the first instance, it will be found a wise precaution to insert meters on all large connexions as a check upon waste and undue consumption, where the consumer is not to be charged by measure.

OBITUARY.

MR. P. G. HAMERTON.—Mr. Philip Gilbert Hamerton, the editor of the *Portfolio*, died on Sunday at his villa, Parc des Princes, Boulogne-sur-Seine, at the age of sixty. Among his principal works on Art are "A Painter's Camp in the Highlands," "Etchings and Etchers," "The Graphic Arts;" he also in early life published a work on Heraldry. Residing for some time in Scotland, before making his home in France, he produced in 1855 a volume of verse, "The Isle of Loch Awe, and other Poems," with illustrations by himself, and subsequently contributed to the *Fine Arts Quarterly Review*, the *Fortnightly Magazine*, and the *Saturday Review*, of which latter journal he was for two years—1866-8—the art critic. Mr. Hamerton was an honorary member of the Burlington Club, of the Royal Society of Painter-Etchers, an *officier* of the French Academy, and of other artistic and learned societies.

SIR D. A. LANGE.—Sir D. A. Lange, civil engineer, of Hyde Park, and Hurstpierpoint, died suddenly on the 2nd inst. The deceased was appointed, in 1858, by Said Pasha, Viceroy of Egypt, constructor of the Suez Canal, and was for some years Director in England of that work, on the completion of which he received the honour of knighthood from the Queen. He was a Fellow of the Royal Geographical Society, of the Society of Antiquaries, and of a large number of learned Associations, both at home and abroad.

GENERAL BUILDING NEWS.

CONGREGATIONAL CHURCH, MIDDLESBROUGH.—The first of a series of services to celebrate the opening of St. George's Congregational Church, Middlesbrough, was held on the 23rd ult. The buildings are in the central thoroughfare of the town, and cover an area of 1,280 square yards. The style is a free treatment of Early Gothic. The church is entered by a large arched doorway placed at the base of the tower dividing the church from the other buildings. The tower is 16 ft. square, and rises to upwards of 100 ft. The church itself, which is cruciform in shape, consists of nave, aisles, double-gabled transepts, and choir. The aisles are low and the windows small. Ample lighting is obtained by clearstory windows and large openings in the gables. The roofs are barrel-shaped, finished inside with unvarnished pitch-pine. The choir is placed to the west, the end being apsidal, and is divided from the nave by a moulded arch. The floor of the choir is raised above that of the nave, stepped for the stalls, the pulpit being placed at one side of the choir-arch, the reading-desk on the other, with the communion-table between the two. The aisle floors are laid on wood blocks set in concrete. The stalls, both of the nave, transepts, and choir, are of pitch-pine, shaped and moulded, and give a liberal amount of space to each worshipper. The communion railings, communion table, and pulpit are of oak and pitch-pine, specially designed. The ground floor provides accommodation for 586 adults, and a small gallery is placed across the eastern end of the nave, providing seats for other seventy. The whole of the windows are filled with tinted cathedral glass in lead frames. A roomy organ-chamber is provided on the north side of the choir, which has arched openings both into the choir and north transept of the church. Special exits have been provided. The buildings for the Sunday-school and social work are placed alongside the church, and front into Prince's-road and Pelham-street, having entrances and exits from both. Including the basement, these buildings are three stories in height. There are six class-rooms and recreation-rooms (three intended for the use of women and girls, and three for the use of men and boys) on the ground floor. The upper floor consists of a schoolroom, 56 ft. long and 30 ft. wide, exclusive of a platform recess and further rooms, and provides accommodation for 500 persons. The buildings are heated with hot-water pipes. Mr. J. Mitchell Bottomley, of Middlesbrough, is the architect, and the contractors are Mr. John Johnson, builder, of Middlesbrough, and Mr. R. T. Snaith, joiner, of Darlington.

NEW VICARAGE HOUSE, ALL SAINTS', KENSINGTON PARK.—The building, which is not yet quite completed, is of large size but of plain design, formed of stock brickwork with bands, patterns, and angles of red brick. A few window-heads and string-courses of Bath-stone, and some stepped roofs and gables lend a little relief to the design. The principal rooms are on the ground floor, where there is a drawing-room with a bay-window, dining-room, and study. In the basement is a large room for parochial meetings, and the usual offices. Above are two floors of bedrooms. The roofs are covered with tiles. The house stands on the north side of All Saints' Church, and has been erected by means of voluntary offerings from the congregation, aided by grants from the Ecclesiastical Commission, and other Church societies, for the Vicar, the Rev. Canon Trench. The builders are Messrs. Allen & Sons, of Kilburn, and the architect Mr. E. P. Loftus Brock, F.S.A. The whole has cost about 3,000*l.*

LYCH-GATE, ENGLEFIELD, BERKS.—A new Lych-gate and Churchyard Cross were dedicated at Englefield on the 4th inst., the former being the gift of the squire, Mr. Richard Benyon, of Englefield Park, and the latter of both squire and people, "in memory of much sickness, many deaths, merciful recoveries, in village and school." The Cross is of Hopton-wood stone throughout, and the Lych-gate of home-grown oak, roofed with oak shingles and resting on flint walling. Both works are carried out by Messrs. Wheeler Brothers, of Reading, the smith's work was by Mr. E. Downing, of Stony Stratford, and the whole has been carried out from the designs and under the supervision of Mr. E. Swinfen Harris, of London and Stony Stratford.

INFECTIOUS DISEASES HOSPITAL, LEITH.—The memorial-stones of the new infectious diseases hospital in course of erection for the Leith Corporation at East Pilton, Ferry-road, were unveiled on the 29th ult. by Provost Bennet. According to the *Scotsman*, it was resolved to have the hospital erected on the cottage principle, and accordingly the architect, the late Mr. James Simpson, produced plans from which, with certain modifications, the building is being built under the superintendence of Mr. George Simpson, who succeeded his father as Burgh Architect. The buildings, which are of brick, include four ward blocks, isolation ward, administrative block, discharging block, laundry and disinfecting block, mortuary, reception-rooms, and gate-lodge. Each of the four ward-blocks is to be divided into two, and in each division there will be ten beds, with two additional beds for private or delirious patients. In the isolation ward there will be ten beds, so that altogether there will be ninety-eight beds. The sanitary arrangements of the buildings have received careful attention. It is expected that when fully equipped the hospital will cost about 35,000*l.* The contractors are:—Mason, Mr. James Kinnear; joiners, Messrs. Drysdale & Gilmour; plumber, Mr. P. Knox; slaters, Messrs. M'Lean & Reid; plasterer, Mr. J. S. Sutherland.

RESTORATION OF HEVINGHAM CHURCH, NORFOLK.—Hevingham Parish Church was re-opened, after the restoration of the roof of the nave, on the 24th ult. The new hammer-beam roof replaces one that had been erected in 1600, and, owing to decay, was ceiled early in the present century. The work has been carried out by Mr. Chapman, of Hanworth, under the instructions of Mr. H. J. Green, Diocesan Architect.

CHANCEL, HEAVITREE CHURCH, EXETER.—A new chancel has just been opened at Heavitree Church, Devon. The new work consists of a chancel (taking the place of the small one pulled down) and two transepts (one used as an organ-chamber, and the other as a morning chapel). There are crypt vestries the whole size of the addition. The new tower is of early fifteenth-century work. The interior arches are of stonework, and the roofs are of solid oak. That of the chancel is waggon-roof, with moulded ribs, and on the south side of the chancel is a sedilia. The sanctuary steps are of solid polished Devonshire marble. The dressed stonework is from the Box ground quarries, Bath, and the stone for the walling is from Churston and Berry Head quarries. The architect is Mr. E. H. Harbottle, of Exeter; the general contractor is Mr. Lapthorn, of Plymouth; Mr. Dart, Crediton, undertook the oakwork; while the carving has been carried out by Mr. Rogers, of Exeter. The total cost of the work has been between 4,000*l.* and 5,000*l.* In the chancel is a carved oak altar-table, with super-altar, designed by the architect. The front is divided into three panels; the central one contains a foliated cross, and in the flanking panels are "Alpha" and "Omega" respectively, intermixed with carving. The super-altar is of the same material, and the whole has been carried out by Messrs. Harry Hems & Sons, Exeter.

ROYAL FREE HOSPITAL, GRAY'S INN-ROAD.—The new buildings, erected after, as we are informed, Mr. William Harvey's designs, are nearly completed. They comprise a dispensary, board-room, and secretary's offices, isolation wards, casualty-room, laundry, and residential quarters for the medical and nursing staffs. These occupy the site of the old front, with laundry, in Gray's Inn-road, which had formerly been a barrack and stables of the City Light Horse Volunteers. The improvements extend also to a reconstruction of the drainage, and fresh fire-extinguishing apparatus; and are estimated to cost 28,500*l.*, towards which 22,500*l.* has been subscribed. The north or "Sussex" wing was rebuilt in 1855; the south and east blocks in 1877-9. The hospital was founded, 1828, in Greville-street, Hatton Garden, by Dr. Marsden, and removed to Gray's Inn-road fifteen years afterwards.

ALL SAINTS' CHURCH, PETERBOROUGH.—On the 1st inst. another stage towards the completion of the new church of All Saints, Peterborough, was reached by the dedication of the new portion of the building which has been added. The church as it at present exists, yet wanting the tower to add a finish to the scheme, has cost about 5,000*l.* The present church is capable of seating 500 persons. The work has been carried out by Mr. John Thompson from the plans of Mr. Temple Moore, of Hampstead, London. The style is that of the fourteenth-century Decorated period. The exterior is of Sutton stone, with Clipsham and Bath stone dressings, and the interior work is Bath stone and brick, flat pointed and distempered for decoration. The nave is 21 ft. wide, and taking the south aisle, which runs parallel with the nave for the whole length, the width of the church is 40 ft., whilst the length from east to west is 104 ft. The church has flamboyant east and west windows, and it is further lighted on the north and south. The roof of the nave and chancel is pointed, the exterior being covered with tiles, and the interior panelled and ribbed with deal, painted respectively blue and cream. The iron tie-rods which run across the nave are painted red. The roof to the aisle is covered with lead on the exterior, and on the interior it is panelled with deal, which is coloured to correspond with the nave. The floors are wooden blocks, deal in the nave and aisle, but oak in the chancel. Round the interior there is a dado with cement panels and wood framing. The approaches to the church are by a porch on the south side, over which there is a figure of "The Blessed Shepherd," which has been carved and presented by Mr. Allan, sculptor. A porch is provided at the west end. A niche has been left, where it is proposed to place a figure of Our Lord with angels on either side. In the interior a traceried decorated oaken screen has been erected. The carving of the screen has been wrought in the workshops of Mr. J. Thompson.

CHURCH, MAYBURY, SURREY.—The foundation-stone of the new Church of St. Paul, Maybury, was laid recently by Lord Midleton. The new church, which, when completed, will provide seating accommodation for about 600 persons, will be built in the thirteenth-century style of red brick with grey stone pillars. At present only the nave and chancel, providing accommodation for about 300 persons, are to be built. The total cost of the first portion of the work will be about 3,000*l.* The work is being carried out by Messrs. Harris & Son, builders, of Woking, from plans prepared by Mr. Ewan Christian, of London.

BRISTOL CATHEDRAL RESTORATION.—The Dean of Bristol has circulated a statement of the progress made towards the restoration of the cathedral. From this it appears that the central tower is completed. The ceilings of the choir and transepts have been thoroughly cleaned and re-distempered. Ventilation is being provided by new casements in the windows throughout the choir. The north-east and south-east tower-piers, with a view to make them more secure, have been filled in with nearly two tons of cement. All the concrete for raising the floor of the choir by seven steps, from its entrance to the Holy Table, is complete. The walls and piers in the choir are being cleaned from the roof downwards. The marble pavement for the choir will probably be all laid down by the end of the year, and the newly-adapted stalls fixed in their place at the western end by Christmas. In addition to all this, a stained-glass memorial window has been presented to the Lady Chapel, and the remaining window is promised. Canon and Mrs. Tetley are restoring two of the four bays of the ruined south cloister at their own expense, and Mrs. Gale Coles undertakes to restore the third. There remains one more bay to be restored. Mr. Pearson has made a careful survey of the exterior fabric of the building, from the north transept round to the Newton chapel, and on to the transept on the south side, and it appears that all the easternmost part urgently needs repair. This will cost 4,458*l.*

HAREWOOD HOUSE, HANOVER-SQUARE.—The Royal Agricultural Society has entered this week into possession of Harewood House, Hanover-square, their new premises. Harewood House, 13, Hanover-square, formed a portion of a much larger block purchased by the Duke of Westminster and Sir Walter Gilbey, who gave the Council of the society the option of acquiring the portion they wanted, for which—the necessary alterations included—the society have paid 30,000*l.* The mansion was the residence of Lord Harewood, and was built by Richard Adam, one of the famous brothers from whom the Adelphi took its name. All the rooms are of handsome proportions, and are decorated in their well-known style. The whole of the extensive additions, alterations, and restoration has been carried out by Messrs. Holland & Hannen from the plans and under the direction of the architect, Mr. Arthur Vernon.

FOREIGN AND COLONIAL.

FRANCE.—There has been a meeting between the Minister of Public Works and a deputation from the Municipal body of Paris in regard to the Metropolitan Railway. The delegates asked for the addition of a certain number of lines, returning to the system adopted by the Municipal Council in 1891. If the Government admits this proposal, it will nevertheless reserve the right to order the execution of the work in sections, as it may consider that urgency demands.——The works of the prize-men at Rome, in architecture, painting, and

sculpture, have been, as usual, exhibited at the Ecole des Beaux-Arts.——M. Henri Chardon, "Auditeur" of the Conseil d'Etat, has been appointed general secretary for the 1900 Exhibition.——The Municipality of Paris propose to acquire the Hôtel Saint-Fargueau, near the Carnavalet, in order to enlarge the Municipal Library.——The Director of the Department of Fine Arts has commissioned from M. Barbefeuille a bust of the celebrated tragic actress, Mdlle. Raucourt, for the decoration of the foyer of the Théâtre Francais.——M. Albert Maignan is at present engaged in directing the execution, from his own cartoons, of the stained-glass windows intended for the decoration of the church of St. Philippe at Roule. The subjects of the windows are Sainte Clothilde, St. Louis, Saint Vincent de Paul, St. Denis, and St. François de Sales.——M. Geo. Roussel has been commissioned to execute the paintings in the Salle de Maringes of the Mairie, at Charenton. ——M. Maurice Yvon has been appointed architect to the Colonial Office.——M. Louis Hista has been appointed Professor of Decorative Composition at the school in connexion with the Sèvres manufactory.——The works are shortly to be commenced for the prolongation of the north pier at Fécamp. The expense is estimated at 202,000 francs.——In a field called the "Clos-ferré" at Saint Pierre-la-Vieille (Calvados) the ruins of an important Gallo-Roman city have been discovered. A memoir on the subject has been presented to the Académie.——The death is announced, at the age of fifty-four, of the painter Charles Frère, who was a very regular exhibitor of rather sadly-coloured landscapes with groups of peasantry and horses, rustic fêtes, &c. Charles Frère was born at Paris. He belonged to the Société des Artistes Français, and had received medals at the Salons of 1882, 1883, and 1889.——The well-known archæologist Léon de Palustre has died at Tours, at the age of 56. He had been Chevalier of the Legion of Honour and President of the Société Archéologique of Touraine. His death has interrupted an important work on the History of the Renaissance in France. Among his works may be mentioned "Le Trésor de la Cathédrale de Trèves," and "Melanges d'Art et d'Archéologie."——We learn also the death, at the age of sixty, of Georges Alexandre Roger, member of the Société Centrale des Architectes. He was a pupil of his father and of M. Questel, and took part successively in the work carried out at the Tribunal de Commerce and that at the Église Saint Augustin. At the time of his decease he was a divisional architect of the Department of the Seine. He took part in the building of the Collège Rollin, for which his father was architect, and built a good many private houses in Paris and in the suburbs.

MISCELLANEOUS.

THE COMMISSION OF SEWERS.—A long discussion took place at the meeting on Tuesday of the Commissioners of Sewers of the City of London on the recommendation of the Special Committee which has been sitting for a considerable time upon the question of the reorganisation of the Engineers' Department, consequent upon the death of the late Chief Engineer, Colonel Haywood. The late Chief of the Staff was appointed some time ago to the vacant post of Chief Engineer, but the appointments to the subordinate positions have been delayed. Out of ten *employés* only the three or four leading ones were recommended with an increased salary, the remainder with various periods of service from three to forty years being recommended for reappointment at their former salaries. Exception was taken to the report of the Committee principally on the ground of unfairness or partiality in promoting Mr. J. G. Garthwaite, with 8½ years' service, with a salary of 350*l.* a year in place of 240*l.*, over the head of Mr. H. E. Stacey, with 21 years' service, who had been in receipt of 260*l.* a year, and to whom it was proposed to give 300*l.* a year, 50*l.* less than the Chief Assistant. Mr. Wallace proposed as an amendment that the report be once more referred back to the Special Committee, and the amendment was eventually carried. Some of the Committee's opponents demanded that the whole of the *employés* should be dismissed, and that candidates should be invited by open advertisement to apply for the whole of the ten places. Two other propositions to rescind resolutions adopted at previous meetings had obtained precedence as special matters, one of them being the question of erecting a crematorium at Ilford Cemetery, which was carried at the last meeting by a small majority. In consequence of the long time spent in the previous discussions, it was decided to further adjourn the matter. The other motion to rescind, made at the instance of Mr. Royle, was in opposition to the resolution passed on July 17 to pave a part of Upper Thames-street with asphalte. Wood and granite had many advocates as against asphalte, and Mr. Alderman Green elicited the information from the Engineer that an asphalte was known which was not only noiseless, but less objectionable on account of slipperiness than any yet laid down in London. The Engineer said such an asphalte was in the market, but no one had any experience of it in this country. The motion to rescind was eventually carried by 33 against 14, a majority only one over the necessary two-thirds required to rescind a motion.

NATIONAL REGISTRATION OF PLUMBERS.—The annual public meeting of the Edinburgh and East of Scotland District of the National Registration of Plumbers was held in the Lecture Hall of the Philosophical Institution, Edinburgh, on the 1st inst., Sir Alexander Christison, Bart., presiding. In their report the Council expressed regret that the Plumbers' Registration Bill had not become law, and mentioned that "the Bill has, as formerly, had the opposition of the ironmongers." The Chairman, in moving the adoption of the report, commented upon the importance of registration, and pointed out that the Public Health, the Burgh Engineer's, and the sanitary departments of the city of Edinburgh now insisted on employing plumbers who were registered. Professor Ivison Macadam seconded, and expressed regret that the number of masters coming forward for registration was very small. The report was adopted, after which Sir Douglas Maclagan was elected President, and Mr. Alexander Allan, vice-president.

BURKE STATUE, BRISTOL.—On the 27th ult., Lord Rosebery unveiled the statue of Edmund Burke, which stands on St. Augustine's Bridge, Bristol. The figure is of bronze, and is placed on an Aberdeen granite pedestal. Mr. Havard Thomas was the sculptor. The Scotch granite basement is some 12 ft. high. The pedestal consists of seven pieces of Aberdeen granite, and was erected by Messrs. Cowlin & Sons.

LIVERPOOL FREE LIBRARY.—We have received a handbook of the books on architecture in the Liverpool Free Library; a remarkable and unusual collection for a general public library, and such as we doubt if many such libraries can boast of. This may be partly accounted for by the fact that the late Mr. J. A. Picton, the architect after whom the "Picton Reading-room" was named, had so much to do with the Liverpool Library, and has probably left his traditions behind him. The Handbook is the first of an intended series, which are to make the contents of the library better known to specialists. The librarian Mr. Cowell, informs us that a "Handlist of Technical Works," published two years ago and distributed freely through the workshops of the city, had a most marked effect on the issue of that class of books from the library.

THE BOROUGH POLYTECHNIC INSTITUTE.—The annual distribution of prizes to the students at the Borough Polytechnic Institute took place on the 1st inst., when the certificates and prizes were given away by Sir B. Samuelson, M.P. Mr. C. T. Millis, Principal of the Educational Department, in his report, pointed out that there had been an increase in the number of students as well as in the actual work done. Moreover, there was a growing tendency to continuity on the part of the students. For the City and Guilds of London Institute examination there were 144 candidates, and of these 92 had passed, 16 obtaining honours. In the Science and Art Department examination 120 students presented themselves, an increase of 57 per cent. over the preceding session, and of these 86 secured passes. In the Society of Arts examinations thirty-two candidates were examined as against nine in the previous session. Eight passed in the second division, and twenty-one in the third. Sir B. Samuelson, in addressing the students, said that the labours of the Royal Commission on Technical Education had been successful mainly on account of the work of the scientific men who sat on it, notably Sir H. Roscoe and Sir P. Magnus. He was glad that so many students gave up so much of their leisure time to perfecting their knowledge in their various crafts, thus contributing to the advancement of the crafts and the benefit of the community. The Art schools, originally schools of design, had made great strides forward. This change was due to many men, notably to Mr. J. Bryce, M.P., who had called attention to the City parochial funds lying waste, and to those at the head of the newly-created polytechnics. There were, however, even now, in London, in proportion to population, only one-fifth of the students that were to be found in the great manufacturing towns of the Midlands and the North, but he believed that London was making rapid progress, and that the difference was rapidly diminishing. Comparing our schools with those of the Continent, we were more practical than the Germans, and we did not attempt, as did the French, to finish the education in the school; that should be done in the economic workshop. The Borough Polytechnic was a new institution, but it was on the right track; it combined practice and science, it paid its teachers for fair work, and yet did not get into debt. In conclusion he appealed to the students to adapt themselves readily to industrial changes, to be versatile, to qualify by the study of other subjects than their own, to form sound judgments, not to be led away by specious arguments, but not to fear new ideas, not to entertain jealousy of capital and employers, but to make use of them, to save so as to become capitalists themselves, for in the co-operation of capital and labour was the solution of the labour question. The prizes were then distributed.

CONTRACTS FOR SCHOOL BOARD WORK.—The London Building Trades' Federation have sent a copy of the following questions to all the candidates for the forthcoming School Board elections:—Are ou in favour of contractors supplying with each tender a schedule of the wages paid to their employees, and where found less than the trade union rates that the tender be not entertained? Are you in favour of the insertion of a clause in all contracts compelling the Board's contractor to recognise the working hours of the London district? Are you opposed to contractors sub-letting any portion of work to one or a number of workmen? Are you opposed to any contractor sub-contracting any portion of his contract without the direct sanction of the Board? Are you in favour of the enforcement of a penalty for any evasion of the Board's terms of contract? Are you in favour of the Board, where possible, doing their own work direct, and without the intervention of a contractor? Are you in favour of practical mechanics only being appointed by the Board as clerks of works?

SALE OF BUILDING ESTATE, FULHAM.—As will be seen from our advertisment pages, Messrs. E. & H. Lumley will sell at the Mart, Tokenhouse-yard, E.C., on the 20th inst., the freehold building estate known as "Ivy Lodge," 907, Fulham-road. The estate has frontages to the Fulham-road, and includes an old-fashioned residence, with gardens and grounds of nearly two acres.

THE SANITARY INSPECTORS ASSOCIATION.—In connexion with the course of lectures and demonstrations arranged by the Sanitary Inspectors' Association for Sanitary Officers, Professor Vivian B. Lewes, F.S.C., F.I.C., delivered the fourth of a series of five lectures on "Combustion, and the Influence of its Products on Health," at St. James's Hall, Piccadilly, on Monday evening. The lecturer said that, having shown the members of the Association the actions which went on during combustion, and the part played in combustion by the atmosphere, he would turn their attention a little more fully to some of their combustibles, and to some of the products of combustion other than those they had been studying. All the combustibles used practically for fuel purposes contained carbon as the chief constituent. Carbon and hydrogen were the main factors in all the ordinary kinds of fuel, and all the fuels that they commonly used were of vegetable origin. Professor Lewes then explained that cellulose was the solid matter in woody fibre and vegetable growths of all kinds, and he described how it was formed. He pointed out that woody fibre varied very much in the way in which it was packed into plant life, and that upon that variation the different kinds of wood almost entirely depended. A very curious thing about moisture in wood was that there seemed to be a point beyond which they could not dry it; no matter how much any kind of wood was dried, it would generally retain about 20 per cent. of moisture. When wood was burned they never got more than about 25 per cent. of its weight left behind as pure charcoal. The lecturer dwelt upon the very great power of absorption possessed by freshly-burned charcoal, and observed that this property made it of exceptional value for sewer-traps, respirators, and other purposes where they required the absorption of gases which would otherwise be injurious or at any rate unpleasant. If they could fit up a trap over the mouth of a sewer with 3 in. of freshly-burned charcoal, it would not allow a trace of sewer-gas to come out for some weeks, and the baking of the charcoal in an oven would revivify it and give it fresh power for another considerable period. Not only did this absorption go on, but there was a chemical action in charcoal in the direction of the destruction of the gas already absorbed. After mentioning that woody fibre was capable of being converted into several other forms of matter used largely for fuel, the professor dealt with the conversion of vegetable matter into peat, which he said was an intermediate stage between the woody fibre itself and coal. It was afterwards converted into several kinds of coal and subsequently into hard coal like anthracite, whilst the last stage in the change was that it became pure carbon, or what was known as graphite, or black-lead. He exhibited a table showing the gradual change which took place, *i.e.*, the gradual elimination of the hydrogen and oxygen, lignite, the softest coal, being excessively inflammable, while anthracite—one of the last stages of the conversion—was a very hard, smokeless coal, which was much less easy to ignite and keep burning. He went into these details, he said, in order to make his next lecture, which would be upon "Smoke," more interesting. In further remarks he dealt with the production and effects of the gases known as carbon dioxide and carbon monoxide. Professor Lewes will deliver his fifth and last lecture next Monday evening.

SEWERAGE SCHEMES, DURHAM.—The Chester-le-Street Union Rural Sanitary Authority have instructed Mr. D. Balfour, M.Inst.C.E., F.G.S., of Newcastle-on-Tyne, to prepare plans for the main sewerage and sewage disposal of Low and Middle Handon Hold, and also Thornton Fold, Urpeth, situate in the above Union.

THE INCANDESCENT GAS-LIGHT WORKS.—The new premises in Westminster of the Incandescent Gas Light Company, who are the manufacturers in England of Dr. Von Welsbach's patents, have just been completed. The principal advantages of the light are known to most of our readers. It consists of a specially-constructed Bunsen burner; over this Bunsen or atmospheric flame is suspended a filament or cylinder, technically termed the mantle

which, immediately the burner is lighted becomes brilliantly incandescent, giving out a clear, soft, and steady light. This mantle, whose process of manufacture was shown, is made of ordinary cotton in the first place; this is then passed through a fluid composed of zirconia, thorina, and lanthanum, after which it is dried, placed in a strengthening fluid, then burnt by a gas-jet, which effectually destroys the cotton. The remaining gauze substance is then heated over an ordinary gas-jet, dipped in collodian varnish, dried, and finally dipped in methylated spirits. The whole process is carried out on the company's works. The average efficient life of a mantle is stated to be about four months, or 500 hours actual burning. The mantle was formerly supported in its position by a side rod ending in a ring at the top from which the mantle hung. This rod, however, was liable to bend over owing to the heat, and this caused sometimes the breakage of the mantle, or of the chimneys, or even of both. In the latest improvement, however, the mantle is supported by a central rod of a fire-resisting material which not only cannot be bent, but being quickly raised to incandescence, actually adds to the brilliancy of the light. Apart from details, the interest in the light lies more particularly in the various important advantages it seems to possess over the ordinary burner. In the first place, according to a report by Professor Carlton Lambert, of the Royal Naval College, Greenwich, it is considerably more economical than any gas-burner in the market, an important point to the consumer. According to Professor Lambert, a Bray's burner (No. 7) gives 2½ candles per cubic foot of gas; an Argand burner gives 3½ ditto; a Regenerative burner gives 8 to 10 ditto; a Welsbach, I.G.L. burner gives 18 to 20 ditto; or, in other words, the incandescent gas-light is about one-seventh the cost of gas used through a Bray's burner, one-fifth that used through an Argand burner, and half the cost of a Regenerative burner, From a hygienic point of view also it possesses some superiorities over the ordinary burners; it is well known to everybody that gas burnt through an ordinary burner gives a smoky flame which will quickly deposit carbon on any article suspended over it, as may be seen if you hold a white plate over an ordinary gas flame; if the same plate is held over an atmospheric gas flame, such as the incandescent, it remains perfectly white. The light therefore possesses the advantages of electricity in this respect, in preserving the cleanliness of ceilings and decorations. The perfect steadiness of the light in comparison with the flickering of the ordinary gas-burner is at once apparent; its coolness again, compared with ordinary gas may be noted, for, although it cannot compare with electricity in this respect, it is computed that only one-half to one-seventh of the gas that is needed in the ordinary burner is required with this system, and therefore there is a consequent reduction of heat to this amount. For the same reason the generation of carbonic acid gas is reduced to a similar extent. The incandescent burner can be applied to any existing gas-fitting. One of the greatest drawbacks to the system up to the present seems to have been the fragility of the mantle already described, and which is raised to incandescence by the flame of the Bunsen burner, but the reduction in the price of these to half their former price has considerably modified this objection.

LEGAL.

WHAT IS A BUILDER'S FOREMAN?

TUCK *v.* GREGAR & SONS.

A CASE which turned on this point was heard before Judge French and a jury at the Bow County Court on the 2nd inst., which resulted in a loss of over 30*l.* to the builders, on a simple legal point. William Tuck, a bricklayer, of Forest Gate, sued Messrs. Gregar & Sons, builders, of Lett-road, Stratford, to recover 29*l.* for injuries received through the negligence of defendant's foreman. The facts were as follows:—On April 30 Tuck was at work on a school, being erected for the West Ham School Board, at Canning Town. The work was being hurried, as Mr. J. P. Newman, the architect, was to complete his inspection on the following day. Tuck was standing on a scaffolding, completing a window arch, when Flegg, the alleged foreman, said the scaffolding must come down. He knocked off the scaffolding-boards with a straightedge, accidentally struck the board on which Tuck was working, and Tuck fell a distance of sixteen feet. He was taken to the London Hospital, five operations were performed on his left arm, and he would never be able to work as a bricklayer again. His earnings were 1*l.* 19s. per week. The facts were not disputed; but Mr. Satlock, for the defendants, contended that Flegg was not a foreman within the meaning of the Act. He had been an under-foreman for eleven months, taking orders from the clerk of the works, and giving them to the bricklayers; but for eight days preceding the accident he had worked at manual labour; therefore, at the time of the accident, he was not a superintendent, as the Act required, but an ordinary workman, and defendants could not be held responsible for his negligence towards a fellow workman.

Mr. Morton, for plaintiff, contended that as the bricklayers took their orders from Flegg, he must have been their foreman. If he assisted in the work for a few days, because the firm was pressed, that did not disentitle him, as his wages were those of a foreman.

His Honour, in summing up, said it was not a question so much of law, as of fact, as to whether Flegg was a foreman at the time of the accident.

The jury returned a verdict for plaintiff for the full amount, 29*l.*, and his Honour certified for full costs.

A DISHONEST FOREMAN.

FALSIFYING PAY-SHEETS.

AT the County of London Sessions (north of the Thames), sitting at Newington *pro tem.*, before Mr. Loveland-Loveland, William O'Keefe, 38, carpenter, was, on the 25th ult., indicted on several counts for stealing certain sums of money, the property of William Scrivener and others, his masters; for attempting to steal other sums; for conspiring with others in stealing the same; and for making false entries in certain accounts with intent to defraud. Mr. Bodkin, instructed by Mr. F. Freke Palmer, appeared on behalf of the prosecution.

The prosecutors are Messrs. William Scrivener & Co., builders and decorators, 18, Fitzroy-road, Regent's Park. In July last the firm had a contract to clear away certain *débris* and rebuild on some ground in Whitfield-street, Finsbury; and on the 10th of that month the prisoner was engaged as general foreman on that job, at 2*l.* 15s. a week. It was his duty to engage and discharge men, and superintend the making-up of the time-sheets, for which he was responsible. These were sent into the office at the end of the week, and on Saturday a pay-clerk was sent to pay the men the amounts on the time-sheet, which the prisoner would call out as each came forward. There were about eighty or ninety men on the job, and the wages would come to about 100*l.* a week. On July 28, an under-foreman, named Punchard, who had been in the employ of the firm from a boy, and had been temporarily in charge of this job until the prisoner's appointment, informed Mr. J. W. Scrivener that something was wrong. Punchard was therefore removed from the job, and the duty of making out the pay-sheets devolved upon the prisoner, who was summarily discharged on August 4, and had since made no application for the week's wages he could have claimed in lieu of notice; in fact, he went to Brighton, where he was apprehended on a warrant on September 8. When engaged the accused produced first-class testimonials as to character, extending over twenty years.

The evidence of Henry Punchard, under-foreman, was to the effect that it was his duty to make out the time-sheets under the prisoner's direction. On Thursday, July 26, a man named Stevens was discharged by the prisoner, under whose directions witness gave him a ticket for 1*l.* 8s. 2d., which he drew. In making out the pay-sheet on the following day, witness marked Stevens as "paid off." On the Saturday a strange man came up to the pay-box and gave the name of Stevens (No. 72), the name and number of the man who had been paid off on the previous Thursday. The pay-clerk, who had previously been spoken to, objected to pay the man, and on being asked by the prisoner as to whether the man had been at work or not, the witness replied that he had not, and that the real Stevens had been paid off on Thursday. Prisoner thereupon said there was some mistake, and there must be two Stevens on the job. He then requested the clerk to pay the man, saying he would be responsible, and the man received 1*l.* 8s. 2d. Witness was perfectly certain that man had never worked there at all. On the following Monday prisoner spoke to witness about Stevens, saying it was a bad job. Witness replied: "You know as well as I do the man was not working." To which prisoner replied: "Well, if he wasn't working on the job, you might have said he was; anyhow, here's a quid for you" (handing him a sovereign). Afterwards prisoner said: "I'm going to have some money over this job. I don't care whether I get the sack or get locked up; I've had 15*l.* a week over smaller jobs than this." In another case a man nicknamed "Punch," who had never worked at the place, drew money in the name of Green. Next morning prisoner said to witness "That came off all right last night; here's a dollar for you" (handing him 5s.). When witness returned after being absent, and the pay-sheets had been made out by the prisoner, the latter asked him to ink over the names of four men that he (prisoner) had put down in pencil on the sheet but who had not been working at all. Witness refused, and on the following Saturday pay for these four men was refused. The first of those who came up to the pay-box was spoken to, upon which he and three more who had been loitering outside disappeared. In another case a man applied on a Saturday to the prisoner for a job. Prisoner said he could not put him on then, but might be able to do so on the following Monday, but told the man to stay about as he would be useful about twelve o'clock. That man was afterwards paid for a week's work as Manning. It was the same man "Punch" who had drawn in the name of Green and the following week wanted to be paid again as Manning.

This evidence was borne out by Mr. Cloutman and Mr. G. Bass, clerks in the employ of Messrs. Scrivener. The former spoke of the man called "Punch," whom he recognised when he came for money in the name of Manning, as having previously been paid off twice, once as Green and next as Stevens, while Mr. Bass spoke as to two men claiming pay, one as Jeffries and the other as Jeffrey, only one of them having been at work. James Hacotree, scaffolder, also gave corroborative evidence. He collected tickets from the men, and had seen some paid who had not worked. Evidence to the same effect was given by Andrews and Coxon, two men who had also been employed on the same job, and this concluded the case for the prosecution.

Prisoner called one witness, Mr. Thomas Hazell, 64, Rockingham-street, Newington-causeway, who said he was with the prisoner outside the works in Whitfield-street, on July 28, when a man giving the name of Manning came up and asked O'Keefe if his money had been left. O'Keefe said "yes," and handed the man something wrapped in paper.

In his defence the prisoner addressed the jury at considerable length, urging that if there had been any mistakes in the time or pay-sheets it was owing to the defective system with which Punchard, who looked after them in the first instance, had kept his accounts. All the blame was attributable to Punchard and not to him (prisoner). The only money that had passed between him and Punchard was 1*l.* repaid, which he had previously borrowed. Punchard knew about the man called "Punch" getting the money, but had deliberately perverted the matter before the Court, and he knew also the men whose names had been left off the sheet. It the prosecutors had been defrauded it was owing to the careless way in which the sheets were kept. It was not likely that with his twenty-five years good character he would put himself in the power of these men for a few shillings when any one of them might turn round and ruin him in a moment.

Mr. Bodkin having replied on the points raised by the accused in his defence,

The learned Judge, in summing-up, said this appeared to be a considerable contract undertaken by a large firm and required careful supervision. The witness, Punchard, knew perfectly well the prisoner was coming to superintend the job, and there could be no question of jealousy as had been suggested. He was sorry to say that there had of late been a number of cases in which time-sheets had been inaccurately kept, sometimes for fraudulent purposes. It had been reported to Messrs. Scrivener that certain persons had been drawing money from their works who had never worked there, and the firm would have failed in their duty to the public had they not taken action in the matter, when they were told by an old and trusted servant what was going on. His Lordship went on to point out the prisoner's dealings with Punchard, who appeared to have done all an honest man should do in the interest of his employers, who sent him away from the work for a time, in order that prisoner himself might have to make up the sheets, and his accuracy and honesty might thus be tested. What the result was they had heard. He failed to see what good the prisoner's witness had done for him, for if the prisoner had paid a man named Manning anything out of the usual course and not through the pay-clerk, the jury had a right to ask themselves whether it was not that man's share of what he had helped to defraud Messrs. Scrivener of.

The jury found the prisoner guilty.

His lordship said all who had listened to the evidence must agree with the verdict. Plaintiff had been guilty of atrocious scoundrelism and had made his case worse if possible by the way in which he had attempted to throw dirt and discredit upon the principal witness against him without the slightest warrant for so doing. The man Punchard had given his evidence well and the jury thoroughly believed him, though the prisoner had tried to blast his character and suggest that he had made the charges through spite. He sentenced the prisoner to twelve months' hard labour.

CAPITAL AND LABOUR.

DISPUTE IN THE LONDON BUILDING TRADE.—A dispute has arisen in the London building trade between the Master Builders' Association and the London Building Trades Federation, and has resulted in 300 men leaving their work. The masters contend that at the conclusion of the great strike of 1892 it was mutually agreed that the unionists should work with the non-unionists, and that the employers should make no distinction between the two classes of workmen. The masters allege that while they have kept to their part of the agreement the unionists have again and again refused to work with non-unionists, and they have, therefore, through the Master Builders' Association, given the Federation notice of their intention to terminate the 1892 agreement on May 1st next year, thus giving the six months' notice which was stipulated in the agreement. On the 1st inst. Messrs. G. Trollope & Sons, builders, of Grosvenor-road, S.W., engaged some men who were non-unionists for one of their jobs; the unionist carpenters, bricklayers, and plasterers at once left the building. Before the day was out the unionists at work on jobs in Duke-street, Mount-street, Park-lane, and Portman-square had also struck. There has been a further extension of the strike, and other jobs of the firm in Cadogan-square, Belgrave-square, and at Stafford House were struck against. In all nearly 300 of the unionist employees of the firm have struck work.

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered.
Sewerage Scheme	Epsom U.R.S.A.	25 Guineas	Dec. 22
*Hotel, Newcastle, co. Down	Belfast and co. Down Railway Company	.....	No date
*Chapel and Schoolroom	English Presbyterian Church, Portmadoc	.....	do.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Additions to Schools, Greenhill	Harrow School Board	Houston & Houston	Nov. 13
Parish Hall, Dyce, Aberdeen, N.B.	Mr. Reid and others	do.	do.
Buildings, Welling-place, Belfast	Y. M. C. A.	Young & Mackenzie	Nov 14
Rebuilding Eagle Tavern, Bierton, near Aylesbury	J. H. Goodey	W. F. Taylor	do.
Four Houses, Woolacombe, Morthoe, Devon	.....	Kerley & Ellis	do.
Cloak Rooms, &c. at School, Radcliffe, Lancs.	.....	Jas. Sellers	do.
*Sewers, Paving Works, and Roadmaking	Hammersmith Vestry	H. Mair	do.
*Drainage Machinery	East Molesey Loc. Bd.	J. C. Melliss	do.
Additions to Workhouse (Board-room, &c.)	Hailsham (Sussex) Union	*Official*	do.
*Buildings, Nottingham, &c.	M. R. Co.	do.	Nov. 15
*Infant School	Dagenham Sch. Bd.	Wigg, Oliver, & Hudson	do.
House, Upper Ponkey, Ruabon, N. Wales	Standing Joint Com.	*Official*	Nov. 17
Cast-iron Pipes and Hydrants	Carlisle R.S.A.	do.	do.
Paving, &c. Hulbert and other Streets	Bury (Lancs.) Corp.	do.	do.
Pier, &c. Ballinrobe, co. Mayo	Congested Districts Board for Ireland	do.	Nov. 19
*Drainage and Alterations at Workhouse	Ware Union	Newman & Newman	do.
Two Escape Staircases at Workhouse	Droxford (Hants) Union	Mitchell, Son, & Gutteridge	do.
Additions, &c. to School, Cliffe, near Selby	.....	T. S. Ullathorne	do.
*School Buildings	Salford School Board	Woodhouse & Willoughby	do.
Vagrant Wards, &c.	Pwllheli (N. Wales) Union	T. Roberts & Son	Nov. 21
Paving, &c. Marine Parade, &c.	Clacton Local Board	A. R. Robinson	do.
*Electric Lighting Works	St. Pancras Vestry	Prof. H. Robinson	Nov. 22

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Commissioners' New Offices, Basinghall-street	Commrs. of Sewers	*Official*	Nov. 23
Additions to Schools, Portreath, Cornwall	Illogan School Board	S. Hill	Nov. 24
Street Works	Heywood (Lancs) Corp.	Jas. Diggle	Nov. 26
Schools, Bull-lane	West Bromwich School Board	A. Long	do.
Thirty-three Houses, Gadlys, Aberdare	.....	C. H. Elford	do.
*Supply of Materials	London General Omnibus Co. Ltd.	*Official*	do.
*Additional Classroom to School	Walthamstow Sch. Bd.	W. A. Longmore	Nov. 27
Paving, Sewering, &c. Valletort-place, High-street	EastStonehouse(Devon) Local Board	W. Stringfellow	Nov. 29
*New Post Office, Woverhampton	Com. of H. M. Works	*Official*	Nov. 30
*Drainage and Sewerage Works	East Ashford U.R.S.A.	A. J. Burrows	Dec. 1
*Weather Screens	North Surrey District School	*Official*	do.
*Making-up Roads	do.	do.	do.
*Street Paving Stones	Glasgow Police Com.	Mr. Whyte	Dec. 6
*Schools and Residences	Kington School Board	J. E. Goodacre	Dec. 7
Schools, Ablewell-street, Walsall	Wesleyan Chapel Trus.	Bailey & McConnal	No date
Additions to Workhouse	Shardlow(Derby) Union	Jas. Wright	do.
Road Works	Colchester Burial Brd.	C. E. Butcher	do.
Two Houses, Moorland-road, Weston-super-Mare	Giles Williams	.....	do.
Excavation, Roadwork, &c. Scandale, Windermere	.....	Stephen Shaw	do.
Schools, Railway-street, Cardiff	.....	Habershon & Fawckner	do.
Rectory, Gidleigh, Devon	.....	Jas. Jerman	do.
Additions to Schools, Ryhope, Durham	.....	Mr. Wanless	do.
*Barging-away Ashes	City of London Electric Lighting Co.	.....	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Architectural Draughtsman and General Assistant	Birkenhead Corporation	100*l.*	Nov. 14
*Surveyor and Engineer	Gainsboro' Local Bd.	175*l.* &c.	Nov. 15
*Architectural Draughtsman	Guildford Corporation	2*l.* 10*s.* weekly	Nov. 16
*Sanitary Inspector	St. Matthew's Vestry, Bethnal Green	120*l.*	Nov. 27
*Engineer and Surveyor	Council of City of Cape Town	800*l.* &c.	Dec. 31
*Foreman of Painters	LondonCountyCouncil	2*l.* 10*s.*	No date
*Surveyor's Clerks	do.	.....	do.

Those marked with an asterisk (*) are advertised in this Number. Competitions, p. iv. *Contracts, pp.* iv., vi., *and* viii. *Public Appointments, pp.* xviii. *and* xx.

MEETINGS.

FRIDAY, NOVEMBER 9.

Architectural Association.—Mr. A. Beresford Pite on "The Study of Modern Architecture." 7.30 p.m.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. J. Wright Clarke on "Details of Plumbers' Work." 8 p.m.

SATURDAY, NOVEMBER 10.

Sanitary Institute (Lectures and Demonstrations for Sanitary Officers).—Inspection of Harrison & Barber's Knacker Yard, Whitechapel.

Dundee Institute of Architecture.—Annual Conversazione.

MONDAY, NOVEMBER 12.

Surveyors' Institution.—Opening address by the President, Mr. Thos. Chatfeild Clarke. 8 p.m.

Clerks of Works' Association (Carpenters' Hall).—Paper by Mr. W. Baker. 7.30 p.m.

Sanitary Inspectors' Association (St. James's Hall).—Professor Lewes on "The Atmosphere and its Sanitary Relations," V. 7.30 p.m.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. W. C. Tyndale on "House Drainage." 8 p.m.

TUESDAY, NOVEMBER 13.

Institution of Civil Engineers.—Address by Sir Robert Rawlinson, K.C.B., the President, and presentation of medals, premiums, scholarship and prizes awarded at the close of last session. 8 p.m.

University Extension Society (Chelsea Centre: Chelsea Town Hall).—Mr. Arnold Mitchell on "English Architecture," VI. 3 p.m.

WEDNESDAY, NOVEMBER 14.

Carpenters' Company (Lectures to Students on Sanitation).—Mr. H. Law on "Principles of Calculating Areas, Cubic Space, &c.; Interpretation of Plans and Sections to Scale."

Sanitary Institute (Lectures and Demonstrations for Sanitary Officers).—(1) Inspection and Demonstration of Artisans' dwellings and Disinfecting Stations at Chelsea. 2 p.m. (2) Professor H. Robinson on "Sewerage and Sewage Disposal." 8 p.m.

Northern Architectural Association. — President's Address. 7.30 p.m.

THURSDAY, NOVEMBER 15.

Northern Architectural Association (University Extension Lectures).—Mr. D. H. S. Cranage on "Mouldings." 7 p.m.

FRIDAY, NOVEMBER 16.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. Charles Mason on "Scavenging, Disposal of House Refuse." 8 p.m.

Institution of Civil Engineers (Students' Meeting).—Mr. John F. C. Snell on "The Economics of Direct-Current Central Stations." 8 p.m.

SATURDAY, NOVEMBER 17.

Sanitary Institute (Lectures and Demonstrations for Sanitary Officers).—Inspection of the Southwark and Vauxhall Waterworks, Hampton. 3 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

19,909.—INSPECTION COVER FOR SEWERS: *W. J. Bugler.*—This invention consists of a cover and frame of iron, &c. The frame has a groove round the top to receive the projection cast on cover, locking by means of lugs and catches, so that, placing the cover on frame with a slight turn, it is securely fastened. Indiarubber or some similar soft material is placed in the groove to ensure a perfect joint.

20,239.—WHITE-LEAD: *J. H. Noad and another.*—In the manufacture of white-lead an electrolysis process is added, which is set out in detail in the specification.

21,055.—PAPERHANGINGS: *C. Green.*—To perforate or cut off the edges of the paper a circular disc of steel is used, so that the edge can easily be detached by tearing, leaving the edges straight and clean.

21,872.—SLIDING SASHES: *F. Maclean and another.*—A pair of kneed and cranked loose pin hinges are used for each sash stile, with a separate upper and lower socket, so that the windows may open inwards, for facility in cleaning, &c.

22,344.—ORNAMENTING EARTHENWARE OR CLAY SINKS: *J. W. Ward.*—A wheel, with a pattern on its periphery or edge, is used to indent sinks or such like things in earthenware or clay with an ornamental border.

22,790.—SASHES: *W. Osment.*—The cords are fastened on the sashes by a special arrangement of holes and knots.

27.—GLAZING HORTICULTURAL BUILDINGS: *J. Pratt.*—A double pointed or forked metal clip or peg, with a flange bent at right-angles, receives the corner of the bottom edge of each pane of glass when laid between the rafters in the rebates. The points are driven into the rafter (with the flange supporting the glass), thus the glass is pressed in its bed and retained by a clip or peg.

3,243.—EARTHENWARE JOINTS, &c.: *T. W. Twyford.*—To make the joint perfect after it is formed it is coated with an electro deposit.

16,245.—CHIMNEY-TOP: *G. Vogt.*—This is a chimney-top mounting in which a rectangular inverted hopper opens obliquely toward the top, and, being placed between four angle-iron columns, is pressed down upon a support of four flat iron bars and rods.

NEW APPLICATIONS FOR LETTERS PATENT.

OCTOBER 22.—20,103, T. Fawcett, Machines for Pressing and Thicknessing Bricks, &c.—20,113, H. Cartlidge, Potters' Kilns.—20,136, F. Hughes, Automatic Duplex Doorstop and Holdfast.—20,156, E. Cubbin, Firebricks, &c.—20,172, W. Aston, Rolled Metal Joists.

OCTOBER 23.—20,248, F. Furness, Floor-tiles, &c.—20,250, J. Armstrong, Manufacture of Paint, Varnish, &c.—20,251, J. Armstrong, Ventilators.—20,273, E. Abrams, Sash-locks.—20,279, E. Morton & H. Baden, Valve Water-closets.

OCTOBER 24.—20,332, J. Heathman, Ladders.—20,360, J. Maskelyne, Coin-freed Locks or Bolts for Doors.—20,371, The Simplex Window-fittings Company, Limited, and P. Daw, Construction of Window-sashes and Fittings and Fastenings for same.—20,372, F. Phelps, and the Simplex Window-fittings Company, Limited, Bolts and Fastenings for Windows, &c.

OCTOBER 25.—20,395, H. Wilson, Windows.—20,407, R. Gloyne, Permanent Seal Gulley.—20,446, S. Rowley, Lavatories, Sinks, &c.—20,450, L. Shedden, Chimney and Ventilating Cowl.—20,464, W. Bramley, Sliding Sashes.

OCTOBER 26.—20,483, F. Brook, Jointing Stoneware or Earthenware Sewage-pipes.—20,505, H. Butler, Construction of Fireproof Dwellings.—20,511, J. Ingram, Fittings for Sliding Windows.—20,528, J. Hampton & J. Hampton, Limited, Combined Mitre-cramp and Saw-holder.—20,535, F. Wittmann, Material for building purposes.

OCTOBER 27.—20,554, G. Milward & B. Nicklin, Chimney-cowls.—20,555, B. Nicklin, Door-bolts, &c.—20,574, W. Heys, Vulcanisation of Timber.—20,618, L. Bonvoisin, Door and Window Check.—20,625, F. Brook, Jointing Stoneware or Earthenware sewerage-pipes.

PROVISIONAL SPECIFICATIONS ACCEPTED.

16,781, R. Haddan, Material similar to Mosaic.—17,469, F. Woodford, Chimney-cowls.—17,613, E. Spinney, Hinges.—17,614, E. Spinney, Hinges.—17,764, L. Temple, Self-acting Disinfecting Water-closet Pans and Hoppers.—17,797, J. Kennedy, Window-fastener.—17,929, D. Smith, Hinges for Doors.—18,380, W. Walks, Wind and Rain-excluder.—18,672, J. Lachlan, Door-latches and Locks.—18,700, W. Gill & F. Ayton, of the firm of T. Pemberton & Sons, Door-springs and Checks.—19,183, E. Stimson, Lathing.—19,282, A. Butchard, Paint, &c.—19,326, W. Fletcher & J. Tatham, Sash-fastener.—19,396, H. Parry, Kilns.—19,534, J. Tuke, Sanitary-pipes and Joints for the same.—19,576, J. Craven, Moulding Bricks, Tiles, &c.—19,659, C. Darrah & T. Kay, Water-closet Seats and Lids.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

21,801, J. & W. Horsfall, Window Draught-excluder, burglar-proof, and prevention of the window or windows rattling in stormy weather.—22,275, E. Morgan, Chimney-flues.—22,303, J. Jacobs, Coin-released Locks for closet doors, &c.—24,778, W. Large, Mitre-cutting Machine.—6,996, R. Dampier, Windows.—12,525, C. Whitehall, Attaching Door-knobs to their spindles.—17,211, J. Rueben, Fireproof-ceilings.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

OCTOBER 25.—By *Chinnock, Galsworthy & Co.* (at Leeds): The Becca Hall Estate, near Garforth Junction, Yorkshire, 922a. 1r. 32p., f., 25,000*l.*

OCTOBER 29.—By *Charles & Tubbs*: F.g.r. of 150*l.*, Golden-lane, E.C., reversion in 48 yrs, 4,200*l.*; f.g.r. of 295*l.*, Shoe-lane, City of London; f.g.r. of 170*l.* 8s. 9d., Farringdon-ave., sold before auction.—By *Eastman, Brut.*: 32, and 32, Knighton-pk.-rd., Sydenham, f., r. 60*l.*, 69*l.*

OCTOBER 30.—By *A. Barton*: 14, Penn-st., Hoxton, u.t. 43 yrs., g.r. 5*l.*, 220*l.*; 19, Bookham-st., u.t. 42

yrs., g.r. 5*l.* 5s., 325*l.*—By *Ellis & Son:* 81, 83, and 87, East-rd., Plaistow, f., 66o*l.*; 31, Grove.rd., Brixton, u.t. 30 yrs., g.r. 10*l.*, r. 75*l.*, 600*l.*—By *Protheroe & Morris;* 13a. 2r. 14p., Pye Alley Farm, Whitstable, f., 650*l.*; four enclosures of f. land, 11a. 2r. 4p., 298*l.*; enclosures of land, 13a. 1r. 22p., f., 198*l.*—By *Andrew Young:* 2 to 20 even, Culvert-pl., Battersea, f., 2,200*l.*; a plot of land, Fortess-rd., Kentish Town, area 1,150 ft., let for 80 yrs. at 20*l.* per annum; two plots, area 2,140 ft., let for 80 yrs. at 53*l.* per annum; plot of land, Falkland-rd., area 3,100 ft., let for 80 yrs. at 13*l.* per annum.

OCTOBER 31.—By *Salter, Rex, & Co.:* 16 and 18, Lady Margaret-rd., Kentish Town, u.t. 68 yrs., g.r. 2*l.*, 1,180*l.*; 19, 21, and 23, Anson-rd., Tufnell-pk., u.t. 71 yrs., g.r. 17*l.*, r. 165*l.*, 1,590*l.*—By *W. A. Blakemore:* 281, Friern-rd., Dulwich, f., r. 30*l.*, 370*l.*; f.g.r. of 38*l.*, Troy Town, Peckham, reversion in 13 yrs., 1,450*l.*; 29, 30, and 31, South-grove, f., r. 97*l.*, 1,350*l.*; 112, Drayton-pk., Highbury, f., r. 38*l.*, 420*l.*—By *E. Owers:* 7, Goldhurst-ter.-east, Hampstead, u.t. 83 yrs., g.r. 8*l.*, r. 50*l.*, 470*l.*; 18 and 20, England's Lane, u.t. 68 yrs., g.r. 33*l.*, r. 180*l.*, 1,900*l.*; 67, 73, 75, College-pl., Camden Town, u.t. 76 yrs., g.r. 27*l.*, 1,865*l.*; 137 to 143 odd, Penton-pl., Walworth, u.t. 72 yrs., g.r. 32*l.*, 1,300*l.*; 145 to 151 odd, Penton-pl., u.t. 72 yrs., g.r. 32*l.*, 1,300*l.*—By *Inman & Co.:* 34 and 35, Elgin-ter., Maida Vale, u.t. 67 yrs. g.r. 16*l.*, r. 88*l.*, 725*l.*; 26 and 28, Woodfield-pl., Harrow-rd., u.t. 69 yrs., g.r. 12*l.*, 530*l.*; 7, Windsor-pl., u.t. 51 yrs., g.r. 5*l.*, 195*l.*; 12 and 14, Little Grove-st., St. Marylebone, u.t. 20 yrs., g.r. 16*l.*, 215*l.*; 25, Boston-st., Dorset-sq., u.t. 14 yrs., g.r. 4*l.* 14s. 6d., 215*l.*; 3, Chichester-rd., Kilburn, u.t. 63 yrs., g.r. 5*l.*, 250*l.*; 27A, Edenham-st., Westbourne-pk., u.t. 69 yrs., g.r. 7*l.*, r. 27*l.*, 150*l.*—By *R. Tidy & Son:* 20, Melton-rd., Tottenham, f., r. 27*l.*, 245*l.*; "Almora," Berrylands-rd., Surbiton, f., r. 45*l.*, 575*l.*; "Garthmyl," Berrylands-rd., f., r. 45*l.*, 560*l.*; f. rent-charge of 2*l.*, Croydon, 55*l.*; 333 and 335, Essex-rd., Islington, u.t. 51 yrs., g.r. 13*l.* 10s., r. 97*l.* 10s., 1,045*l.*; 11 and 13, Clephane-rd., Canonbury, u.t. 51 yrs., g.r. 13*l.*, r., 84*l.*, 925*l.*; 110 to 116 even, Church-st., Islington, u.t. 43 yrs., g.r. 22*l.*, 1,925*l.*; 211, Southgate-rd., Kingsland, u.t. 34 yrs., g.r. 5*l.*, r. 44*l.*, 355*l.*; 23, Halliford-st., Islington, u.t. 45 yrs., g.r. 6*l.*, r. 38*l.*, 370*l.*—By *D. Smith, Son, & Oakley* (at Ringwood): The Burley Manor Estate, Hants., Ringwood (near).—"Varley Farm," 65a. 1r. 34p., f., 1,675*l.*; f. house and shop, and 1a. 2r. 11p., r. 22*l.* 8s., 500*l.*; numerous enclosures of f. land, 79a. 1r. 27p., f., 3,405*l.*

NOVEMBER 1.—By *Millar, Son, & Co.:* Three plots of f. land, Stafford-rd., Kilburn, 140*l.*—By *Newbon & Co.:* f.g.r. of 13*l.*, Parkdale-rd., Plumstead, and 2*l.*, reversion in 13 and 72 yrs., 250*l.*; 101 and 103, Hither Green-lane, Lewisham, f., r. 62*l.* 8s., 435*l.*; 19, Clarendon-rd., u.t. 64 yrs., g.r. 7*l.*, r. 45*l.*, 320*l.*; 66, Cressingham-rd., u.t. 68 yrs., g.r. 5*l.* 5s., r. 22*l.*, 135*l.*; 5, Weigall-rd., Lee, u.t. 87 yrs., g.r. 7*l.* 10s., r. 45*l.*, 310*l.*; 15 and 17, Rosendale-rd., Dulwich, u.t. 84 yrs., g.r. 18*l.*, 505*l.*: 1 and 3, Victoria-av., Upton-pk., u.t. 92 yrs., g.r. 12*l.*, 365*l.*; 4, Queen's-rd., Buckhurst Hill, and 1, 2, Napier-villas, u.t. 72 yrs., g.r. 15*l.*, r. 65*l.* 9s., 275*l.*; 30 and 32, Herveypl-rd., Walthamstow, u.t. 91 yrs., g.r. 6*l.* 10s., 170*l.*; 11 and 13, Ritchings-av., u.t. 91 yrs., g.r. 5*l.* 10s., 235*l.*; By *E. Wood:* 8. Roskill-rd., Putney, u.t. 91 yrs., g.r. 5*l.* 10s., 225*l.*; 83, Tasman-rd., Clapham, u.t. 81 yrs., g.r. 6*l.* 10s., 240*l.*; 7, Rodborough Mews, Harrow-rd., u.t. 69 yrs., g.r. 4*l.* 10s., 150*l.*; 28 to 36 even, Lansdowne-rd., Leytonstone, u.t. 80 yrs., g.r. 15*l.*, 600*l.*; 133, Herries-st., Harrow-rd., u.t. 89 yrs., g.r. 7*l.* 10s., 160*l.*

NOVEMBER 2.—By *Furber, Price, & Furber:* 1, Hungerford-rd., Camden-rd., u.t. 60 yrs., g.r. 9*l.*, 395*l.*; 49, Linton-st., Islington, u.t. 33 yrs., g.r. 4*l.* 4s., 295*l.*—By *Nokes & Nokes:* 25, Swinton-st., Gray's Inn-rd., u.t. 60 yrs., g.r. 8*l.*, r. 38*l.*, 275*l.*; 88 and 90, Southampton-st., Caledonian-rd., u.t. 30 yrs., g.r. 34*l.* 17s., 145*l.*

[Contractions used in these Lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a, for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G.	ton	8/0/0 — 0/0/0
Teak, E.I.	load	10/0/0 — 16/0/0
Sequoia, U.S.ft.cu		1/10 — 2/-
Ash, Canada	load	3/0/0 — 4/5/0
Birch, do.		2/15/0 — 4/0/0
Elm, do.		3/15/0 — 5/0/0
Fir, Dantzic, &c.		1/10/0 — 3/5/0
Oak, do.		2/10/0 — 4/10/0
Canada		5/15/0 — 7/5/0
Pine, Canada red		2/10/0 — 3/0/0
Do. Yellow		3/0/0 — 5/5/0
Lath, Dantzic, fath		4/10/0 — 5/10/0
St. Petersburg		5/0/0 — 6/10/0
Wainscot, Riga, &c., log		2/15/0 — 5/0/0
Odessa, crown		2/15/0 — 5/0/0
Deals, Finland and 1st red	100	7/0/0 — 9/0/0
Do. 4th & 3rd		7/0/0 — 8/0/0
Do. Riga		7/0/0 — 8/10/0
St. Petersburg, 1st yellow		9/10/0 — 12/10/0
Do. 2nd yellow		7/10/0 — 9/10/0
Do. white		8/0/0 — 10/10/0
Swedish		7/0/0 — 15/10/0
White Sea		6/10/0 — 14/10/0
Canada, Pine 1st		22/0/0 — 26/10/0
Do. do. 2nd		17/0/0 — 18/0/0
Do. do. prd, &c.		7/10/0 — 10/10/0
Do. Spruce, 1st		8/10/0 — 10/0/0
Do. do. prd & 2nd		6/10/0 — 7/10/0
New Brunswick		6/0/0 — 7/0/0
Battens, all kinds		3/0/0 — 15/0/0
Flooring boards, 1in. 3 in. prep.		0/9/6 — 0/14/6
Do. 2nd		0/7/0 — 0/11/6
Other qualities		0/3/0 — 0/6/6
Cedar, Cuba	ft.	3½ — 4½
Honduras, &c.		3½ — 4½
Mahogany, Cuba		3½ — 4½
St. Domingo, cargo av.		1/2 — 1/6
Mexican do. do.		1/3 — 1/4
Tobasco do. do.		1/3 — 1/6
Honduras do.		1/3 — 1/5
Box, Turkey tom		4/0/0 — 13/0/0
Rose, Rio		7/0/0 — 18/0/0
Teak		6/0/0 — 27/0/0
Satin, St. Domingo		0/0/5 — 0/1/0

TIMBER (*continued*).		
Satin, Porto Rico		0/0/6 — 0/1/6
Walnut, Italian		0/0/3½ — 0/0/7

METALS.		
Iron—Pig, in Scotland	ton	2/2/9½ — 0/0/0
Bar, Welsh, in London		5/12/6 — 5/15/0
Do. do. at works in Wales		5/2/6 — 5/5/0
Do. Staffordshire, in London		6/0/0 — 6/10/0
COPPER—British cake and ingot		42/15/0 — 43/0/0
Best selected		43/0/0 — 43/10/0
Sheets, strong		51/10/0 — 0/0/0
Chili. bars		40/2 6 — 40/7/6
YELLOW METAL	lb	0/0/4½ — 0/0/4¾
LEAD—Pig, Spanish	ton	9/17/6 — 0/0/0
English com. brands		10/0/0 — 0/0/0
Sheet, English, 6 lbs. per sq. ft. and upwards		10/15/0 — 11/0/0
Pipe		11/15/0 — 0/0/0
ZINC—English sheet	ton	18/10/0 — 19/0/0
Vieille Montagne		19/10/0 — 0/0/0
TIN—Straits		66/15/0 — 67/5/0
Australian		66/17/6 — 67/1/0
English Ingots		71/0/0 — 71/10/0
Banca		68/10/0 — 68/15/0
Billiton		67/15/0 — 68/0/0

OILS.		
Linseed	ton	20/2/6 — 20/12/6
Cocoanut, Cochin		28/0/0 — 0/0/0
Do. Ceylon		24/0/0 — 0/0/0
Palm, Lagos		25/10/0 — 0/0/0
Rapeseed, English pale		20/15/0 — 21/0/0
Do. brown		19/5/0 — 19/10/0
Cottonseed ref.		18/0/0 — 19/0/0
Oleine		22/0/0 — 24/0/0
Lubricating, U.S.		4/0/0 — 5/0/0
Do. refined		5/0/0 — 12/0/0
TAR—Stockholm	barrel	1/1/0 — 0/0/0
Archangel		0/12 0 — 0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursday.*]

ALNWICK.—Accepted for additions, &c., to farmhouse and buildings, Clover Hill, near Lambley station, for Mr. J. R. Carr Ellison. Mr. Geo. Reavell, jun., architect, Alnwick:—

Masonry, Slating, and Plumbing.—Longstaff & Sons, Mineral House, Lambley, *via* Carlisle ..£235 12 9
Joinery.—Edgar & Bell, Slaggyford, *via* Carlisle 112 3 3
Plastering.—Longstaff & Sons .....At Schedule of Prices.

BALLYSHANNON (Ireland).—Accepted for the extension of water-supply works, for the Union Guardians at Ballyshannon. Mr. W. F. Gilcriest, C.E., Sligo:—
James Shedden, Ballyshannon £210
[Engineer's estimate, £247.]

BARNSLEY.—Accepted for the erection of a pair of semi-detached houses, Cavendish-road, Barnsley, for Mr. W. J. Frankland and Mrs. A. Crummack. Mr. Robert Dixon, architect, 5, Eastgate, Barnsley. Quantities by architect:—
Masonry.—Walker & Blackburn, Waterloo-road....£441 0
Joiner.—T. & J. Hawley, Penistone 285 15
Plumbing.—S. Rushforth, Eldon-street 169 0
Plastering.—P. Holdsworth, Bradford..... 60 0
Slating.—M. Fleming, Eastgate..... 53 0
Painting.—Stephenson & Son, Peel-street 19 5

BURNLEY.—For the construction of pipe-sewers, manholes, &c., for the Union Rural Sanitary Authority. Mr. S. Edmondson, surveyor, 18, Nicholas-street, Burnley:—

W. H. Bury	£664 12 6	Joseph Wadge	£401 3 1½
Joseph Brown	588 16 7	J. H. Cook	394 18 4
Samuel Matthews	512 2 0	J. Sharples	298 16 10
Geo. Hunter	426 15 6	Thos. Horrocks, Walton (accepted)	296 6 1½
Chas. Bray	413 4 7		

BURNLEY.—For the supply of 730 yards of 12-in. and 230 yards of 9-in. earthenware socket-pipes, for the Union Rural Sanitary Authority. Mr. Stephen Edmondson, surveyor, 18, Nicholas-street, Burnley:—

Whitaker & Co.	£105 0 0	Fie'dhouse Fire Clay Works	£95 1 1
Brooks & Pickup	95 3 4		
Duckett & Son	95 3 4		

CANNOCK (Staffs.).—For enlarging the board-room, clerk's office, &c., at the Workhouse, for the Board of Guardians. Messrs. J. R. Veall & Son, architects, Wolverhampton:—

H. Gough	£328 10	A. Williams	£298 15
H. Whittome	307 0	M. B. Anderson	295 0
I. Kent	306 0	J. Reynolds, Cannock*	280 0
J. Guest & Son	305 0	* Accepted.	

COVENTRY.—For the erection of school buildings, &c., Red-lane, for the School Board. Messrs. G. & I. Steane, architects, 22, Little Park-street, Coventry. Quantities by Mr. J. Gardner, Earl's Court, Coventry:—

T. G. Golby	£5,113	John Isaac	£4,656
G. F. Smith & Sons	5,089	Liggins & Strong	4,632
J. Parnell & Son	4,984	A. A. Wincott	4,600
J. Bowen	4,888	Kelley & Son	4,500
C. G. Hill	4,842	J. Worwood	4,218
C. Haywood, junr.	4,795	C. Garlick, Coventry*	4,180
		* Accepted.	

DARWEN.—For extensions, Central Stores, Darwen, for the Industrial Co-operative Society, Limited (masonry only). Mr. J. B. Thornley, architect, Darwen:—

Johnson	£4,355	J. Knowles, Darwen*	£3,624
Houldsworth	3,995	R. Shorrock	3,548
B. Lloyd & Sons	3,895	W. Sharples	3,459
		* Accepted.	

DORMANS (Sussex).—For decorations and repairs to house, for Mr. R. Cecil Leigh:—
Turnbull & Son, Northumberland-alley, Fenchurch-street, London, E.C. £625
For erection of Stables.
Turnbull & Son £470

DURHAM.—For additions to Aden Cottage, Durham. Mr. H. T. Gradon, architect, Durham:—

J. Kell	£1,780 0 0	G. Bradley	£1,552 3 0
J. Shepherd	1,725 0 0	W. Wardropper*	1,550 0 0
T. Ainsley	1,652 0 0	J. Whaley (withdrawn)	1,490 0 0
G. Gradon & Son	1,566 17 0	* Accepted.	
C. W. Gibson	1,564 1 2		

[All of Durham.]

EAST STONEHOUSE (Devon).—For the execution of wood-paving works, Union-street, for the Local Board. Mr. W. Stringfellow, C.E., Surveyor, Town Hall, East Stonehouse:—

W. C. Shaddock	10s. od. per yd. super.
C. L. Duke	9 10 ,, ,,
Ambrose & Welch, Railway-place, Bath*	9 1 ,, ,,

* Accepted subject to sureties being approved by the Local Board.

ISLE OF WIGHT.—Accepted for terra-cotta billiard-room, Woodlands Vale, near Ryde, for General the Hon. Somerset J. G. Calthorpe. Mr. Stephen Salter, jun., architect, of "Pondwell," near Ryde, and Maidenhead:—
Isaac Barton, Ryde £690

ISLE OF WIGHT.—For building head gardener's cottage, Cherrygin, near Ryde, for General the Hon. Somerset J. G. Calthorpe. Mr. Stephen Salter, jun., architect, I. of W. and Maidenhead:—
C. Langdon ..... £535 | E. James £516

KESWICK.—For the erection of Sunday-school buildings, Tythebarn-street, for the Trustees of the Primitive Methodist Chapel, Keswick. Mr. W. Weightman and Mr. J. Eastwood, architects:—

Building.			
C. Abbott	£190 10	W. Weightman, Keswick*	£155 0 0
Joinery.			
Grisedale	£99 5 0	Green Bros.	£62 5 0
C. Clark	60 10 0	J. Greenhow, Keswick*	61 12 8
J. Milburn	68 10 0		
Plumbing.			
White	£14 10 0	Porteous	£12 10 0
Dunbobbin	14 7 0	Banks, Keswick*	11 10 0
Painting.			
Railton	£8 16 6	Hall, Keswick*	£6 10 0
		* Accepted.	

LEYTONSTONE.—For alterations and additions to the "Cowley Arms" public-house, High-road, Leytonstone, for Mr. William Dorton. Mr. Fred. A. Ashton, architect, 3, Crooked-lane, E.C.:—

W. Shurmur	£1,849	W. Watson	£1,625
Hearle & Farrow	1,729	J. & H. Cocks*	1,620
W. J. Walker	1,699	J. Holland	1,600
W all & Co.	1,679	Accepted.	

LONDON.—For the erection of the structural part of the New Electric Lighting Station, Eden Grove, Holloway, N., for the Vestry of St. Mary, Islington. Mr. A. Hessell Tiltman, architect, 6, John-street, Bedford-row, W.C. Quantities by Messrs. Young & Brown, 7, Southampton-street, Bloomsbury, W.C.:—

		Extra for glazed-brick facings.
Rider & Son	£24,996	£1,800
Leslie & Co.	24,731	1,670
Higgs & Hill	24,484	1,764
Hall, Beddall & Co.	24,440	1,710
L. H. & R. Roberts	23,493	1,866
Bush & Sons	23,300	1,718
Perry & Co.	23,229	1,689
Holloway, Bros.	23,210	1,938
J. T. Messom	22,750	1,700
W. Shepherd	22,500	—
G. S. Williams & Sons	22,264	1,917
Mattock, Bros.	21,991	1,885
Macfarlane, Bros.	21,685	2,100

LONDON.—For the erection of a doctor's house and nurses quarters at the Infirmary, Cale-street, Chelsea. Messrs. Landsdell & Harrison, architects, 12, Compton-terrace, Highbury, N. Quantities by Messrs. Northcroft, Son, & Neighbour:—

		Credit for old material.
F. Britton	£10,444	£80
Battley, Sons, & Holness	10,347	120
J. J. Smith	10,300	50
Calnan & Co.	10,148	—
Prestige & Co.	9,970	30
F. & H. F. Higgs	9,875	225
O. Craske & Co.	9,850	50
F. White & Son	9,720	80
G. Wade	9,700	120
F. Minter	9,670	45
H. L. Holloway	9,643	120
W. Norton	9,588	50
F. Dupont	9,587	150
A. Wallis	9,587	80
S. J. Jerrard & Co.	9,569	40
W. H. Lorden & Son, Trinity-road, Tooting (accepted)	9,469	150

LONDON.—For the erection of a new warehouse and alterations to an existing warehouse in Boundary-street, Shoreditch, for Messrs. J. Keeves & Son. Mr. William Stone, architect, 2, Great Winchester-street, London-wall, E.C. Quantities by Messrs. Pryce Cuxson & Leigh, 17, Victoria-street, S.W.:—

G. W. Beale	£6,603	W. Gregar & Son	£5,933
Gould & Brand	6,479	J. Stapleton	5,858
F. G. Higgs	6,100	Balaam Bros.	5,794
J. Cessum & Sons	6,056	J. Steed	5,687
G. E. Todd	6,045	G. Knight & Sons	5,637
L. H. R. Roberts	6,033	J. Carmichal	5,625
W. Gladding	5,993	C. Blyton	5,611
Thomerson & Son	5,964	J. Jarvis & Sons	5,494
W. Scrivener & Co.	5,960		

LONDON.—For the erection of flats and warehouse at Mercer-street, Long Acre, W.C., for Messrs. Pankhurst & Co., Limited. Messrs. Kidner & Berry, architects, 23, Old Broad-street, London, E.C.:—

S. J. Scott	£7,639	Gough & Co.	£6,874
Foster & Dicksee	7,278	Scrivener & Co.	6,723
Colls & Sons	7,248	Killby & Gayford*	6,636
Grover & Sons	7,085	* Accepted.	
Munday & Sons	7,050		

LONDON.—For the provision of cookery and laundry centres, &c., in connexion with the West-square schools, Southwark, for the School Board for London. Mr. T. J. Bailey, Architect:—

		If brickwork be built in cement, add.
Hart Bros.	£3,060 0 0	£55
Clarke & Bracey	2,966 0 0	63
W. Downs	2,944 0 0	50
J. & M. Patrick	2,915 0 0	61
E. Lawrance & Sons	2,887 0 0	55
Holloway Bros.	2,873 0 0	49
B. E. Nightingate	2,859 0 0	58
J. Marsland	2,857 0 0	60
Holliday & Greenwood	2,848 0 0	59
N. Lidstone, 96, Blackstock-road, N.*	2,692 16 10	*52

* Recommended by the Works Committee for acceptance.

LONDON.—For the construction of 810 feet stoneware pipe-sewer, &c., Queen's-road, Forest Hill, for the Lewisham Board of Works. Mr. John Carline, Surveyor, Board of Works' Offices, Catford, S.E.:—
Fry Bros., Norman-road, Greenwich £220

LONDON.—For alterations, sanitary improvements, and decorations at 29, Lancaster-gate, Hyde Park, W. Messrs. Mullett, Booker, & Co., surveyors, Albion House, Hyde Park-square, W.:—

Foxley & Co.	£955 8 6	W. B. Head & Sons*	£735 5 0
Kinninmont & Sons	940 4 0	* Accepted.	
Electric Lighting.			
W. Whiteley	£109 17 6		
Rashleigh, Phipps, & Co.	105 0 0		

LONDON.—For alterations, sanitary improvements, and decorations at 49, Lancaster Gate, Hyde Park. Messrs. Mullett, Booker, & Co., surveyors, Albion House, Hyde Park-square, W.:—

E. D. Hook	£1,017 18 0	J. Kinninmont & Sons	£865 0 0
Clarke & Mannooch	887 0 0	W. B. Head & Sons	855 0 0
Foxley & Co.	877 2 11		
Electric Lighting.			
Crompton & Co.	£119	Belshaw	£85
Rashleigh, Phipps, & Co.*	109	* Accepted.	

LONDON.—For alterations, sanitary improvements, and decorations at No. 40, Hyde Park-square, W., and stable. Messrs. Mullett, Booker, & Co., surveyors, Albion House, Hyde Park-square, W.

W. McSwiney	£717 12 6	H. C. Clifton*	£645 0 0
Lilley & Lilley	715 10 0	* Accepted	
Electric Light.			
Rashleigh, Phipps, & Co.	£72		

LONDON.—Accepted for painting and decorating at the New Bridge House, Westminster Bridge-road, for the Camden Brewery Co.
Marchant & Hirst £174

LONDON.—For the erection of a store for books and apparatus, in conjunction with a store for furniture, on the surplus land adjoining the Bowling Green-lane site, Clerkenwell, for the School Board for London. Mr. T. J. Bailey, Architect:—

R. A. Yerbury & Son	£38,320	T. Boyce	£34,180
A. Reed & Son	36,426	Stimpson & Co.	33,998
J. Shillitoe & Son	35,000	E. Lawrance & Sons	33,850
J. Grover & Son	34,753	Foster & Dicksee	32,950
W. Downs	34,570	Kirk & Randall, Woolwich*	31,324
J. F. Collinson	34,510	* Recommended by the Works Committee for acceptance.	

LONDON.—For erecting new offices for the boys' and girls' departments of the Southwark Park School, Bermondsey, and for providing a new system of drainage at the same time, for the School Board for London. Mr. T. J. Bailey, Architect:—

G. Foxley	£1,520	M. Calnan & Co.	£1,231
G. Parker	1,393	Stevens Bros., 1A, Yonge-park, N.*	1,226
G. Newton	1,313		
H. King & Sons	1,290		

* Recommended for acceptance by the Works Committee.

LONDON.—For refitting the offices in connexion with all departments of the Bromley-road School, Lee, and for providing a new system of drainage at the same time, for the School Board for London. Mr. T. J. Bailey, Architect:—

Jas. Smith & Son	£749	M. Calnan & Co.	£690
J. & C. Bowyer	736	A. Black & Son	670
G. Parker	732	E. Triggs, Clapham*	640

* Recommended for acceptance by the Works Committee.

LONDON.—For the provision and erection of three new temporary iron buildings on the site in Page's-walk, Bermondsey, for the School Board for London:—

D. Charteris	£1,880 0	E. C. & J. Keay, Ltd.	£1,663 17
T. Cruwys	1,764 0	Humphreys, Ltd.*	1,644 0
Croggon & Co., Ltd.	1,735 0		

* Recommended by the Works Committee for acceptance.

LONDON.—For the erection of three temporary iron buildings on the plot of vacant land which has been hired in the rear of Acorn-street, Camberwell, for the purpose of providing temporary school accommodation, for the School Board for London. Mr. T. J. Bailey, Architect:—

D. Charteris	£1,994 0	Croggon & Co., Ltd.	£1,750 0
T. Cruwys	1,870 0	Humphreys, Ltd.*	1,712 0
E. C. & J. Keay, Ltd.	1,856 8		

* Recommended for acceptance by the Works Committee.

LONDON.—For the erection of a temporary iron building, foundations, drains, &c., at the Osborne-road, Acton, Board School, for the Acton School Board. Mr. Edward Monson, architect, Acton Vale, W.:—

For Iron Building, &c.—Humphreys, Ltd. £246 0
For Foundations, &c.—E. Arnold 62 5

MANCHESTER.—For reinstating the Church of SS. Simon and Jude, Granby-row, after recent fire. Mr. W. Cecil Hardisty, architect, Manchester and Alderley-Edge:—

Wilson & Toft	£844	F. & E. Haynes	£807

NEWPORT (Mon.).—For the erection of school buildings, Queen's Hill, for the Governors. Mr. Benj. Lawrence, architect, Dock-street, Newport. Quantities by Mr. Charles Mills, Newport, Mon.:—

	With local bricks.		With local bricks.
D. Jenkins	£10,466 0	William Blackburn	£8,640 0
Hyatt, Richards, & Co.	9,345 0	Dyson Parfitt	8,525 0
J. H. Firbank	9,324 0	Alfred Hazell	8,345 0
William Price	9,275 0	John Linton	8,320 0
Henry Parfitt	8,757 10	Ernest C. Jordan	8,274 0
John Jenkins	8,762 0	George Wilkins	8,238 0
A. E. Parfitt	8 750 0	William Gradwell	7,940 15
David Davis	8,730 0	Chas. H. Reed, Newport*	7,700 0

* Accepted.

READING.—For additions, &c., to school buildings, Coley-street, for the School Board. Mr. Joseph Morris, architect, Friar-street, Reading:—

George Henry Tucker	£137 0	William Hawkins	£138 0
George S. Lewis	159 0	George Wernham	128 0
William Goodchild	157 10	George Searle, King's-road, Reading*	122 0
George Simonds	156 12		
McCarthy E. Fitt	139 0		

* Accepted.

SELSTON (Notts).—For the execution of waterworks (two sections), for the Basford Union Guardians. Mr. Geo. Hodson, C.E., Loughborough:—

B. Graham & Sons.	£13,625 0 0	J. H. Vickers	£12,885 0 0
H. Shardlow	13,523 0 0	H. Fotherby & Son	12,845 0 2
Hy. Roberts	13,410 0 0	J. Tomlinson	12,587 0 0
E. Podmore	13,331 10 0	J. F. Price	12,500 0 0
Hy. Vickers	13,050 0 0	J. Wilson & Sons.	12,250 0 0
Wm. Jenkins & Son	12,907 4 8		

SOUTH NORMANTON (Derbyshire).—For the erection of schoo buildings, for the School Board. Mr. J. T. Shardlow, architect, Blyth-road, Worksop. Quantities by architect:—

J. Roe & Son	£2,005 16 6	Henry Vickars	£1,582 0 0
Messom	1,723 0 0	J. H. Vickers	1,574 0 0
G. Smedley	1,683 0 0	Chas. Green, Rotherham (accepted)	1,544 10 0
F. G. Subbs	1,625 17 6		

STOCKPORT.—Accepted for the construction of brick culvert, with manholes, &c., Hempshaw-lane, for the Corporation. Mr. Jno. Atkinson, C.E., Borough Surveyor, St. Petersgate, Stockport:—
W. C. Broadhurst & Co., Stockport £272 8 1

WALSALL.—For the erection of infirmary buildings at the Workhouse, Pleck-road, for the Guardians of the Walsall Union. Mr. H. E. Lavender, architect, The Bridge, Walsall. Quantities by the architect:—

Bishop & Sons	£9 289 10	Willcock	£6,775 0
Harris	7,748 13	Bantock	6,695 0
Hartley	7,530 0	Guest	6,625 0
Lowe & Sons	7,500 0	Kendrick	6,560 0
Insley	7,353 0	Robinson	6,560 0
Smith	7,231 0	Lynex, Walsall*	6,526 0
Webb	7,195 0	Horton	6,500 0
Wistance	6,999 0	Whitehouse	6,381 0
Mallin	6,943 0	Hughes	6,371 0
Gough	6,843 0		

* Accepted.

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"Rota."—G. H. M. & Son.

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WOODEN BUILDINGS,
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FLUATE, for Hardening and Preserving Calcareous Stones and Marbles.

DOULTING STONE.
CHARLES TRASK & SONS,
DOULTING, SHEPTON-MALLET.
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E. A. WILLIAMS, 16, Craven-st., Strand, W.C.

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The attention of Architects is specially invited to the durability and beautiful COLOUR of this material. Quarries well opened. Quick despatch guaranteed. Stonework delivered and fixed complete. Samples and estimates free. Address, The Ham Hill Stone Co., Norton, Stoke-under-Ham, Somerset. London Agent: Mr. E. A. Williams, 16, Craven-st., Strand, W.C. [ADVT.

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EUREKA GREEN SLATES.
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W. DUFFY'S PATENT
IMMOVABLE ACME
WOOD BLOCK FLOORING.
THE PERFECT FLOORING FOR ALL PURPOSES.
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Full Particulars and Prices on application to
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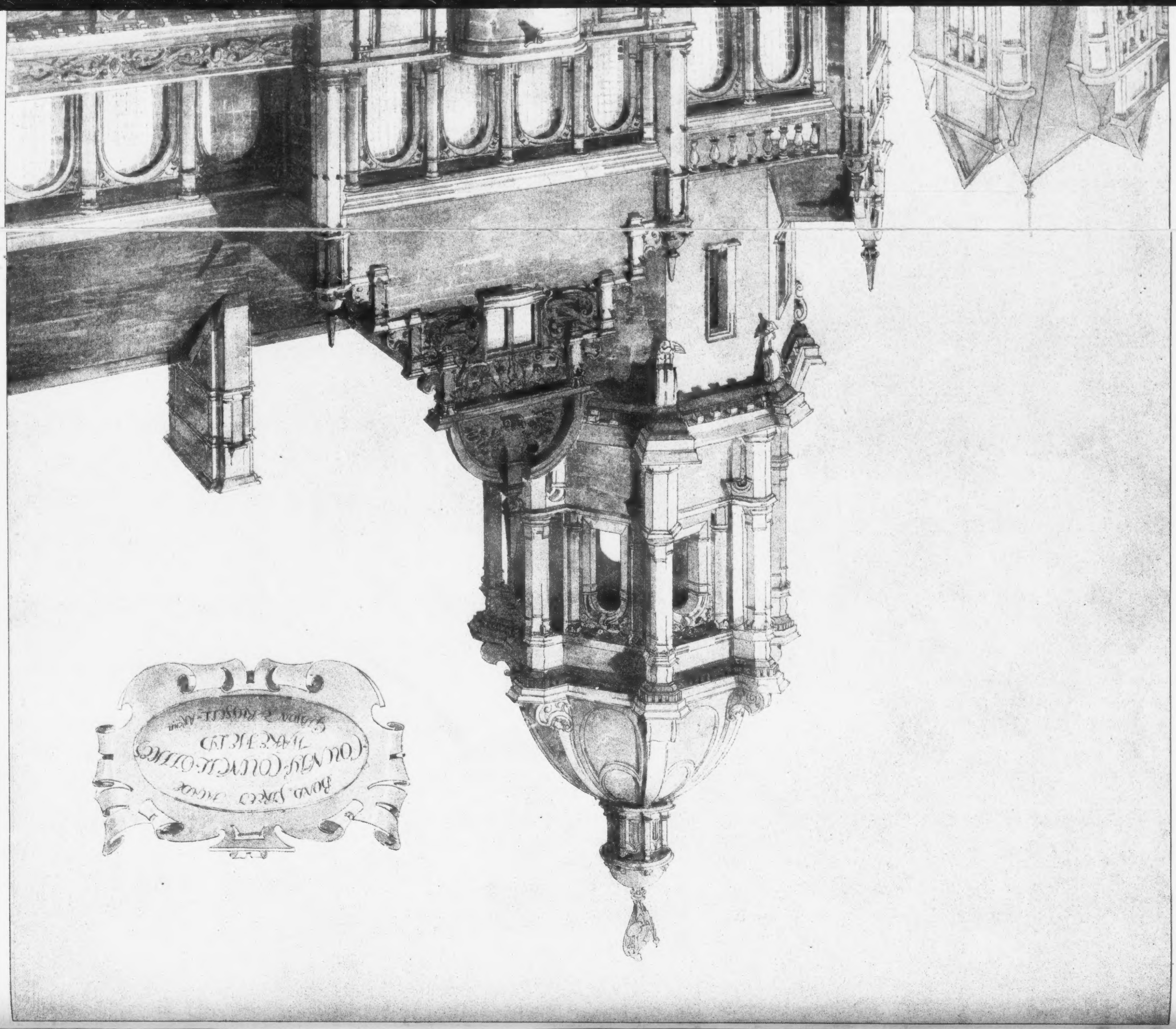
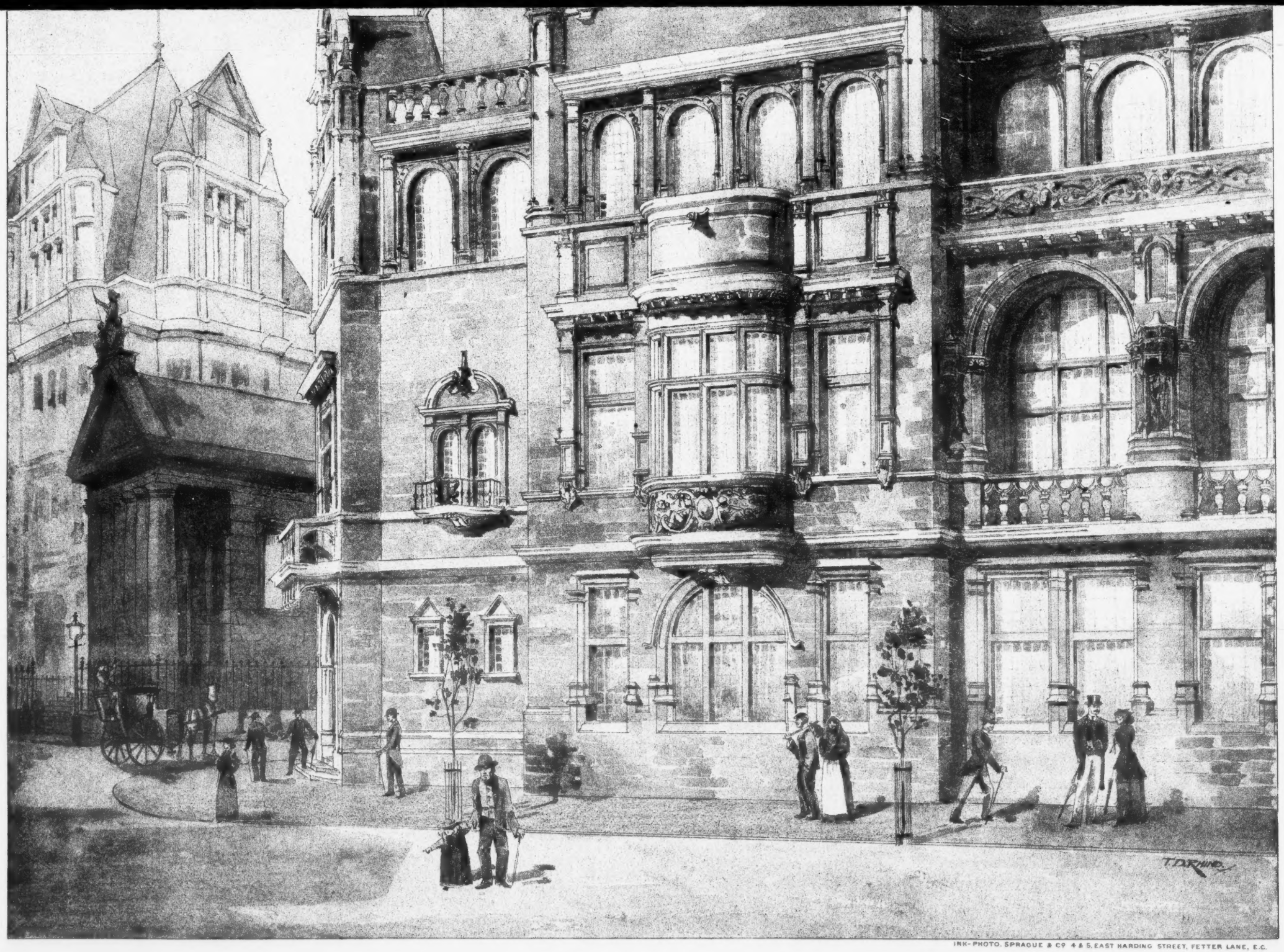


Rond Point Taylor
Council-Office
Plan of the
Square & Royal Mews



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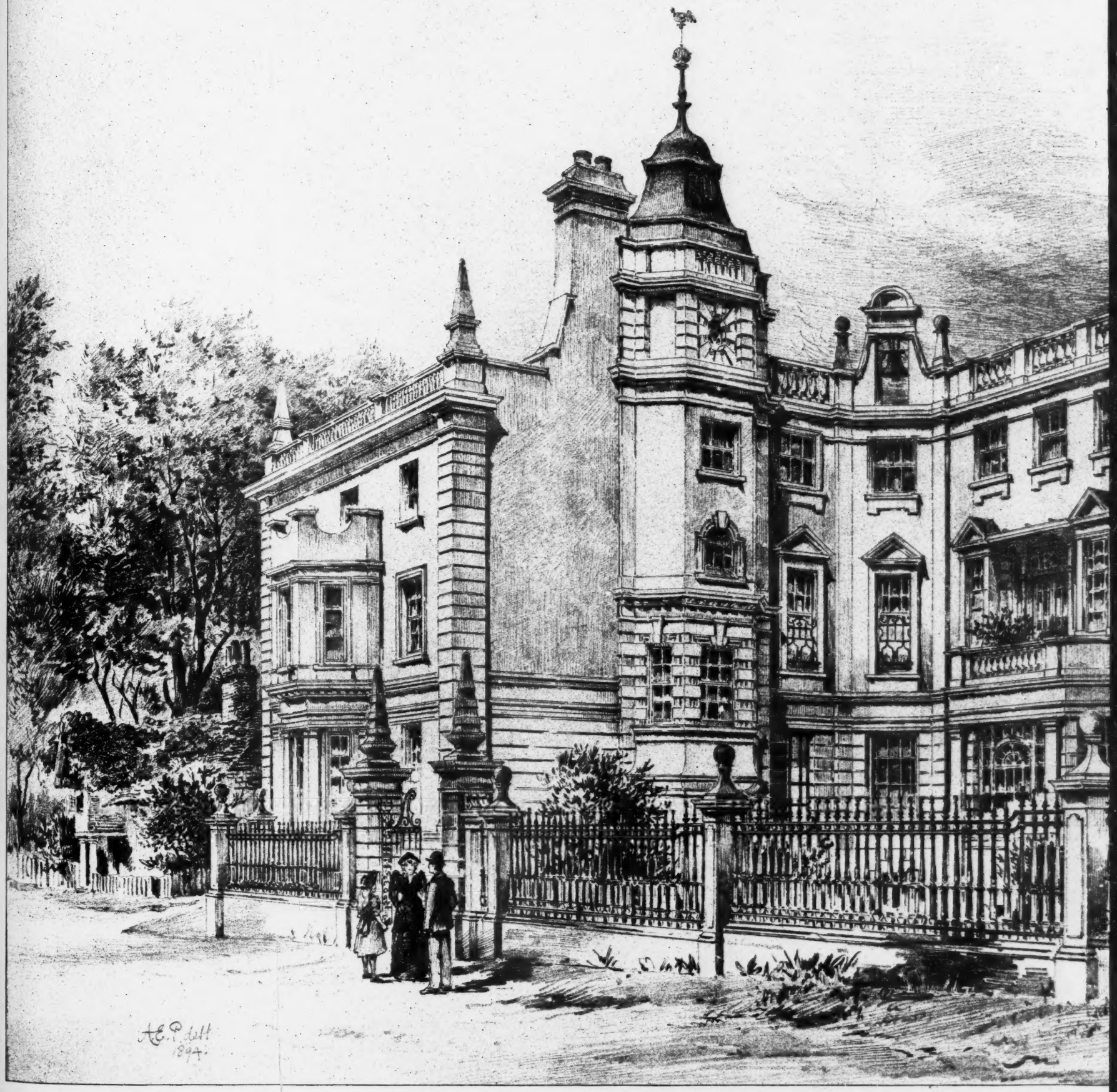
Royal Academy Exhibition, 1894.

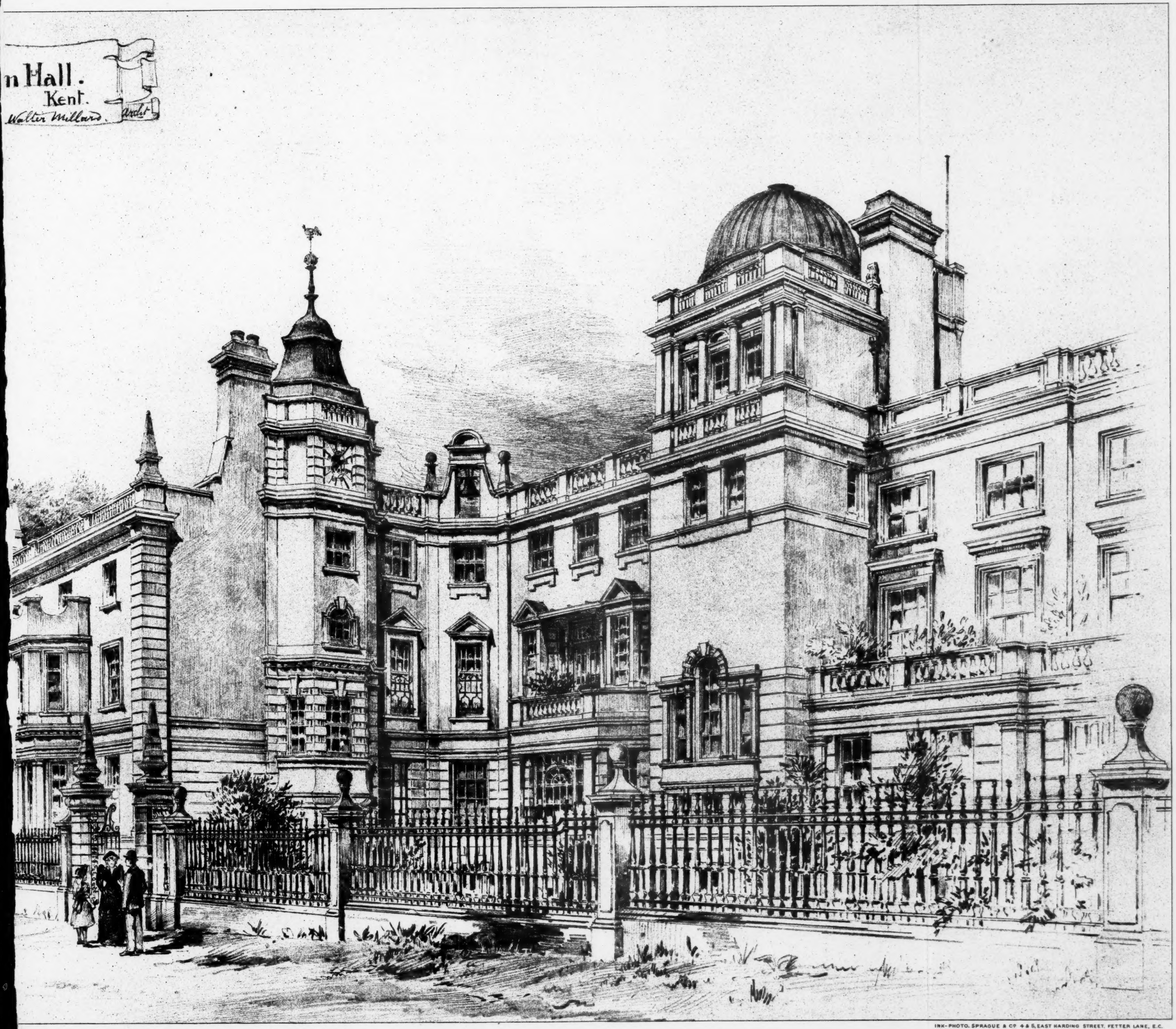
Additions to
Wickham Hall.
Entrance Front. Kent.
Walter Millard. Archt



A.E. Pell
1894.

Royal Academy Exhibition, 1894.

n Hall.
Kent.
Walter Millard. Archt



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Additions to
Wickham Hall · Kent.
Garden Front
Walter Millard · Archt.

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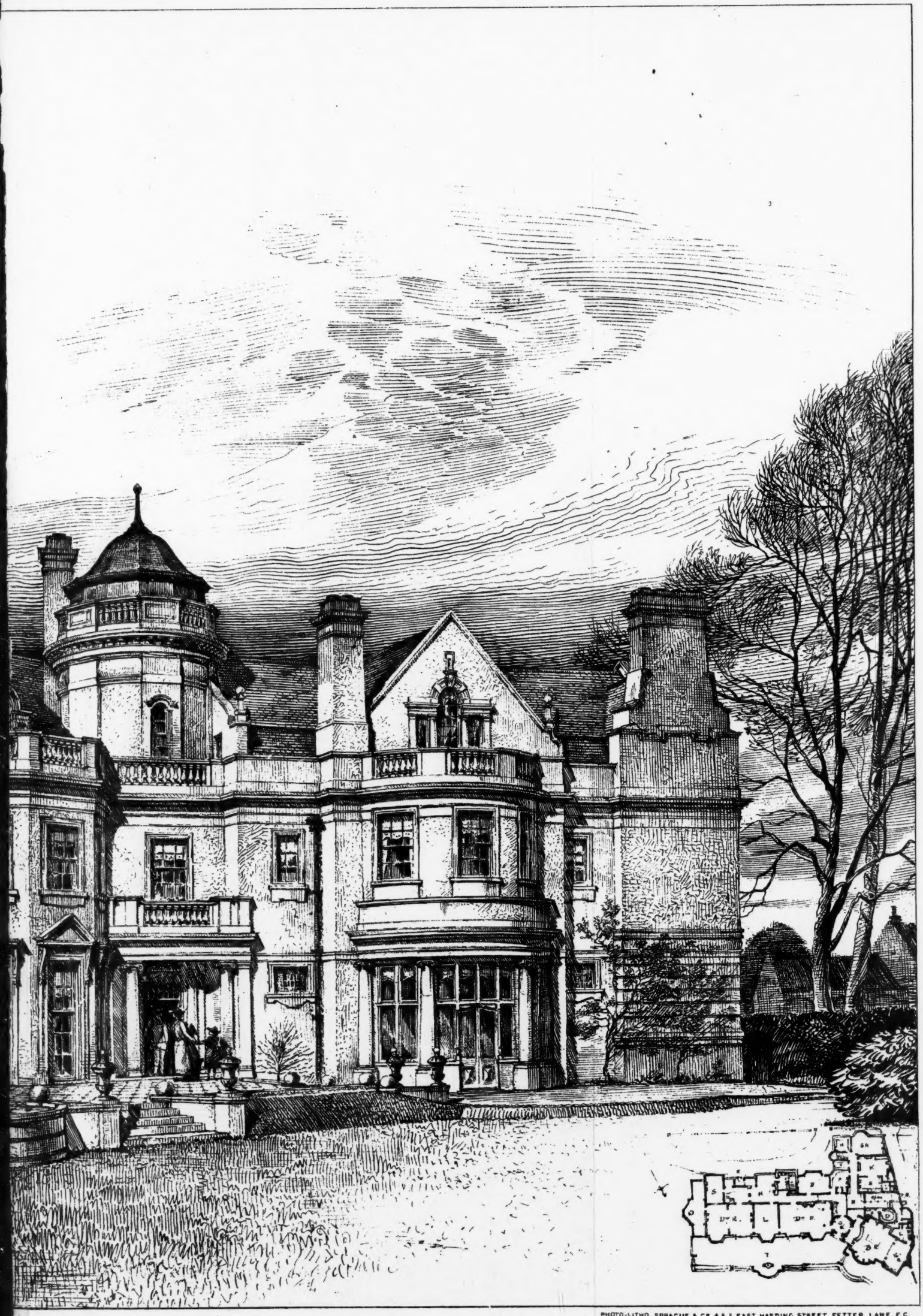

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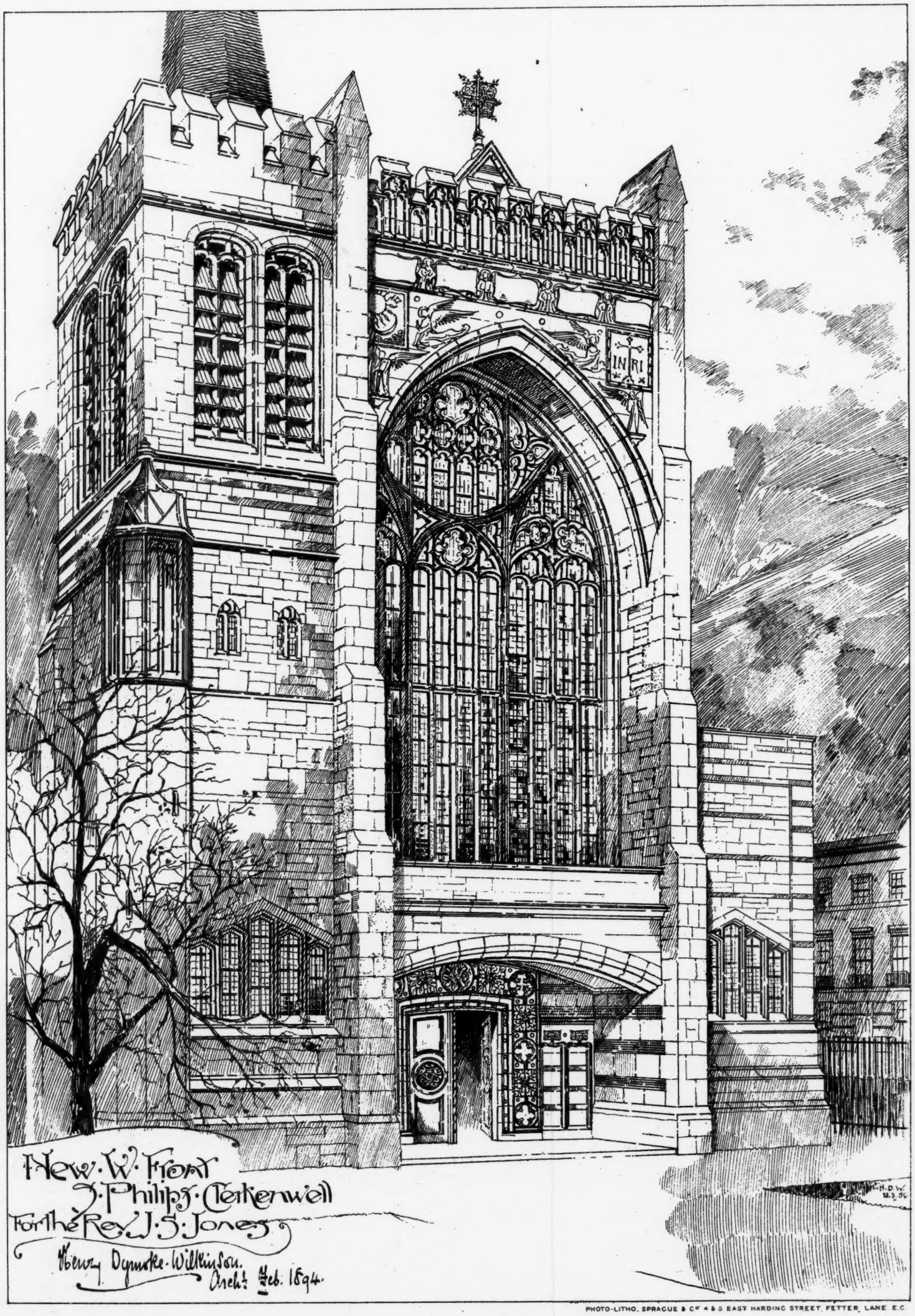
RESTORATION OF THE CHANCEL, CANEWDON CHURCH, ESSEX Mr W Hargreaves Raffles, Architect.

...ademy Exhibition, 1894.

Royal Academy Exhibition, 1



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Royal Academy Exhibition, 1894.